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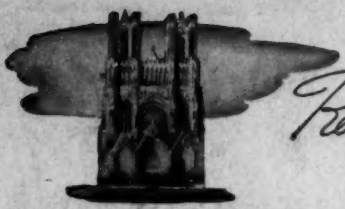

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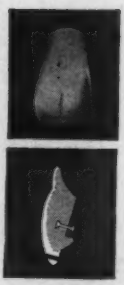

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POSTWAR PLANS OF DENTISTS IN SERVICE: III. PRIVATE PRACTICE

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Private practice is the traditional and accepted way in which the dentist earns his living. Only a small percentage are attracted by careers in full-time salaried positions. It is hardly surprising, therefore, to find that ninety dental officers in 100 definitely intend to enter private practice (reenter is the more appropriate word for most of the officers), and another three may do so when hostilities cease and they are honorably discharged from service. Since, in round numbers, this involves about 20,000 men and means an increase of more than a third in the nation's present supply of civilian dental practitioners, it is of paramount importance to learn where these men are going, to which states and communities, and to observe the effect of their return on the distribution of dentists.

This is the third in a series of reports[1] on the Postwar Planning Questionnaire of the American Dental Association. The questionnaire, which was reproduced in its entirety in the paper on general findings, was distributed among the more than 21,000 dentists on active duty by the War Service and Postwar Planning Committee of the Association, with the cooperation of the chiefs of the respective dental services. Most of the men received their questionnaires in September and October of 1944, and by January 1, 1945, 7,549 questionnaires had been returned. It is on these 7,549 completed questionnaires that the present studies are based.

In the first paper of the series, it was shown that the officers who replied and the entire group of dental officers corresponded so closely in distribution by age, branch of service and place of origin that one could with some confidence make predictions about the entire group from the findings of this sample.

For purposes of presentation, the dental officers who replied will, as in the first paper, be divided into three groups: Group A, dentists who entered service from private practice; Group B, new

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1. Previous papers: Camalier, C. W., and Altman, Isidore: Postwar Plans of Dentists in Service: I. General Findings, J.A.D.A. 32:568, May 1, 1945; II. Plans for Additional Training. Ibid. 32:692, June 1, 1945.

graduates who came directly from dental school or an internship, and Group C, those who had held full-time, salaried positions before entering service.

Percentage Entering Private Practice

The items of the questionnaire to be dealt with here were presented to the dental officers in the following form:

28. Do you plan to engage in private practice? Yes— No—

29. If yes, in former locality— in new locality—

30. If new locality, what is your preference:

Name state———————————

Size of community: Under 5,000— 5,000-25,000— 25,000-100,000— over 100,000—

Table 1 summarizes the replies to questions 28 and 29. (This table appeared as Table 5 in the paper "General Findings." From the last line, showing the number of officers on which the percentages are based, can be gathered the relative size of each group. Group A makes up 73 per cent of the total; Group B, 22 per cent; Group C, 5 per cent.) As indicated at the outset, 93 per cent of the men apparently plan to engage in private practice after the war. The corresponding percentages for the individual groups are: for Group A, 96; Group B, 95, and for Group C, 50, each figure including a small percentage who are undecided about private practice.

Dental officers in Groups B and C who plan to engage in private practice have been tabulated as entering practice in a new community, although some of the men in Group C may have been in practice at some time or other. The data on new versus old community of practice are therefore really significant only for Group A. Of this group, 62 per cent are returning to their former localities, presumably to take up practice, 22 per cent are planning to change to a new community and 9 per cent are undecided about where to practice, whether in their former location or elsewhere. Thus, of all the men who came from private practice, almost 40 per cent may not return to the places where they practiced before the war. This group is large enough to indicate that evident dissatisfaction with the former community reflects certain adverse conditions of practice not limited to a few places. The data provided by the questionnaire do not lend themselves to deep exploration of the problem. They do provide a number of signs, which will be discussed at appropriate points further along in

Table 1.—Percentage Distribution of Dental Officers According to Postwar Plans with Regard to Private Practice

Plans for Private Practice	All Dental Officers	Status Prior to Active Service		
		A	B	C
		Private Practice	Dental School or Internship	Salaried Position
Plan to engage in private practice:				
In former community	44.8	61.6	—	—
In new community	38.6	22.1	92.3	41.0
Undecided as to community	6.5	8.9	—	—
Undecided about engaging in private practice	3.5	3.5	2.5	9.4
Do not plan to engage in private practice	4.7	2.2	3.5	44.6
No answer	1.9	1.7	1.7	5.0
Total	100.0	100.0	100.0	100.0
Number of dental officers	7,549	5,495	1,671	383

this paper and the next one published.

Data for the States

It is in the interest of the individual states to know how many dental officers will eventually settle within their borders —how many former practitioners will return and how many newcomers can be expected. An attempt has been made in this paper to supply what information the study provides on this point. The data are shown in Table 2 and the accompanying figure.

It is important at the outset to stress the limitations of these data. The survey results and the conclusions drawn from them are based on a sample of approximately a third of the dentists in service. Since a sample is being dealt with, the results when applied to the whole dental officer population are subject to a certain amount of error. This is especially true in the instance of those states where the total number of dentists and of dentists in service is small. Moreover, the information summarizes only the expressed wishes of the men. The question of licensure has not been taken into account, although this may prove a stumbling block for many who desire a change of state.

About 10 per cent of the men changing their place of practice or entering practice for the first time gave more than one state as a possibility. To avoid complicating Table 2, the state named first was the one tabulated except in the small number of cases evidencing preference for some other state.

The last column of Table 2 indicates the percentages of dentist veterans coming to each state to practice as compared with the number who left a practice in the state to enter the armed forces. For example, there were twenty replies to the questionnaire from officers who had been in practice in New Hampshire before the war. When a tabulation was made by state of intended practice, there were twenty-three replies in which New Hampshire was named, a ratio, arrived at by dividing 23 by 20, of 1.15 to 1 (or of 115 to 100, as expressed in the table for convenience). Of the twenty-three officers, seventeen were men returning to the same state. This is 85 per cent of the original twenty, as shown in column 3. One other officer, of the twenty-three coming to New Hampshire, had practiced previously in another state. This is expressed in column 4 as 5.0 per cent of the twenty originally from New Hampshire. In the same way, five replies from new practitioners who have selected New Hampshire in which to practice are shown in column 5 of the table as 25.0 per cent of the original twenty officers. To summarize: The number returning to former state of practice, the number coming to that state from other states and the number of new practitioners have for each state been expressed as percentages of the original number who entered service from private practice. The sum of these three percentages expresses the total entering practice in each state as a percentage of the number who left (as of October 1, 1944). Deaths among dentists on active duty, since they are relatively few, have not been taken into account in these computations.

For simplicity, data in Table 2 will be referred to as "ratios." A ratio of 142 for Texas, for example, means that the number electing to practice there is 1.42 times the number who entered service from private practice in the state.

Nevada and Arizona show the highest ratios, 400 and 275, but the number of dentists involved is quite small. One or two dentists more or less would make an appreciable difference. It is significant that almost all the other Rocky Mountain States—New Mexico, Colorado, Idaho, Montana and Wyoming—rank high. High ranking states, in terms of returning dentists to former practitioners, for which the total number of dentists is quite large (exceeds 100) are Florida,

Table 2.—Ratio of Dental Officers Planning to Enter Private Practice in Each State to Number Who Left Private Practice for Active Duty

Geographic Division and State	Number in Sample*	Percentages of Dental Officers			
		Returning to Former States	Coming from Other States	Entering Private Practice for First Time	Entering Private Practice (Total)
		Expressed as Percentage of Number Who Entered Service from Private Practice in Each State			
(1)	(2)	(3)	(4)	(5)	(6)
New England:		Per Cent	Per Cent	Per Cent	Per Cent
Maine	31	100.0	—	55.0	155.0
New Hampshire	23	85.0	5.0	25.0	115.0
Vermont	16	90.9	27.3	27.3	145.5
Massachusetts	240	88.6	5.4	50.6	144.6
Rhode Island	34	82.6	4.3	60.9	147.8
Connecticut	131	94.7	21.3	58.7	174.7
Total	475	90.2	9.5	51.1	150.8
Middle Atlantic:					
New York	1,213	85.8	2.4	40.4	128.6
New Jersey	259	88.5	7.5	33.5	129.5
Pennsylvania	509	82.4	1.2	20.2	103.8
Total	1,981	85.1	2.7	33.5	121.3
East North Central:					
Ohio	267	84.4	7.6	26.7	118.7
Indiana	141	80.3	3.8	22.7	106.8
Illinois	471	74.8	1.6	15.9	92.3
Michigan	257	88.0	7.4	23.0	118.4
Wisconsin	179	80.6	8.3	35.4	124.3
Total	1,315	80.1	4.7	22.1	106.9
West North Central:					
Minnesota	185	82.2	6.6	32.9	121.7
Iowa	154	72.1	2.3	15.1	89.5
Missouri	163	70.4	2.2	18.4	91.0
North Dakota	14	57.1	14.3	28.6	100.0
South Dakota	8	53.3	—	—	53.3
Nebraska	58	61.0	1.3	13.0	75.3
Kansas	62	75.8	3.0	15.2	94.0
Total	644	72.3	3.4	19.7	95.4
South Atlantic:					
Delaware	13	100.0	—	116.7	216.7
Maryland	61	77.3	2.3	59.1	138.7
District of Columbia	48	93.3	—	66.7	160.0
Virginia	65	90.7	16.3	44.2	151.2
West Virginia	30	83.3	4.2	37.5	125.0
North Carolina	53	88.5	23.1	92.3	203.9
South Carolina	26	76.5	11.8	64.7	153.0
Georgia	59	78.8	3.8	30.8	113.4
Florida	152	98.5	73.5	51.5	223.5
Total	507	87.4	22.3	53.9	163.6
East South Central:					
Kentucky	65	82.1	1.8	32.1	116.0
Tennessee	69	88.9	3.7	35.2	127.8
Alabama	54	82.9	7.3	41.5	131.7
Mississippi	32	72.4	6.9	31.0	110.3
Total	220	82.8	4.4	35.0	122.2

Geographic Division and State	Number in Sample	Percentages of Dental Officers			
		Returning to Former States	Coming from Other States	Entering Private Practice for First Time	Entering Private Practice (Total)
		Expressed as Percentage of Number Who Entered Service from Private Practice in Each State			
West South Central:					
Arkansas	20	81.0	4.8	9.5	95.3
Louisiana	74	78.9	—	50.9	129.8
Oklahoma	64	67.7	6.5	29.0	103.2
Texas	243	92.4	15.2	34.5	142.1
Total	401	84.2	10.0	34.7	128.9
Mountain:					
Montana	19	78.6	21.4	35.7	135.7
Idaho	21	92.3	30.8	38.5	161.6
Wyoming	16	75.0	16.7	41.7	133.4
Colorado	77	79.9	48.9	42.2	171.0
New Mexico	21	81.8	81.8	27.3	190.9
Arizona	22	87.5	87.5	100.0	275.0
Utah	30	75.9	13.8	13.8	103.5
Nevada	4	100.0	200.0	100.0	400.0
Total	210	80.5	39.8	37.6	157.9
Pacific:					
Washington	131	86.3	17.6	24.5	128.4
Oregon	81	80.8	26.0	4.1	110.9
California	813	94.8	29.6	31.9	156.3
Total	1,025	92.1	27.5	27.9	147.5
United States**	6,778	83.5	9.3	30.9	123.7

*Numerator of ratio shown in column 6.

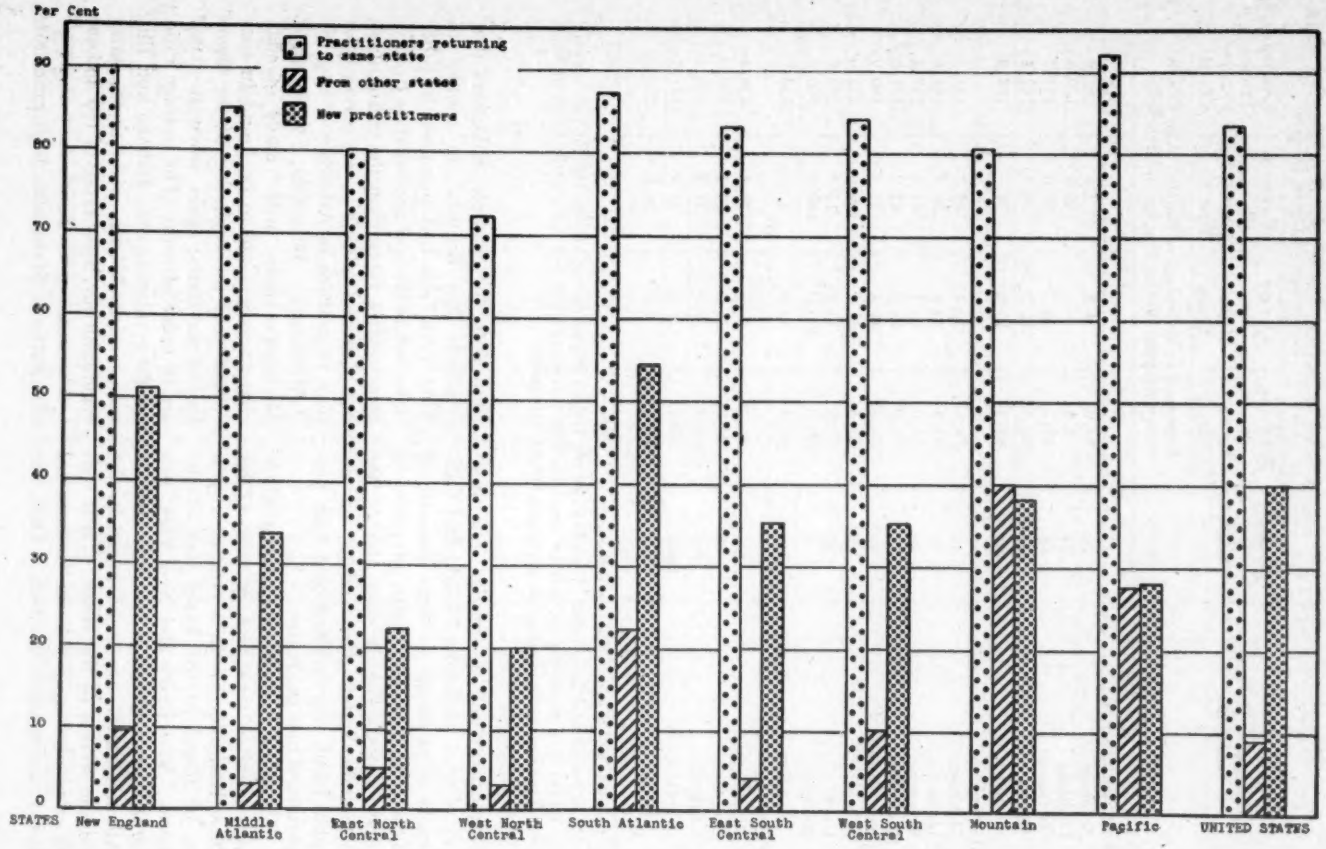
**The percentages in columns (3) and (4) for the United States do not add to 100 for two reasons: (a) 3.9 per cent of the original number who came from private practice will not practice after the war; (b) 3.3 per cent gave information too vague for this tabulation.

Connecticut and California. The number of men preferring Florida and California is made up in large measure of those who, before the war, practiced in other states. This is true also of the Mountain States. Connecticut, on the other hand, was specified by a high proportion of new graduates.

The New England States as a whole are found to rank high in ratio. Only New Hampshire, with a ratio of 115, is to be found in the lower half of the states. New Jersey and New York, two large states and two of the three Middle Atlantic States, are to be found in the middle section of the states. (It is well to emphasize again that the columns are based on relative numbers. Data for New York, for example, indicating that relatively few dentists are coming to New York who had practiced in other states before the war are based on twenty-three replies, more than the entire number of dental officers in the survey who plan to practice in Arizona.)

Minnesota, Wisconsin, Ohio and Michigan—states with many similar characteristics—are to be found in succession near the beginning of the lower half of the states; again, when the states are in order of ratio. The average ratio for these states is 120. Indiana and Illinois, which belong with these states geographically, show ratios of 107 and 92.

The states of the South show an irregular pattern. States with high ratios are



Comparison of percentages of dental officers planning to enter private practice based on number who left private practice for active duty. (Data from Table 2.)

Comparison of percentages of dental officers planning to enter private practice based on number who left private practice for active duty. (Data from Table 2.)

Florida, Delaware, North Carolina, the District of Columbia, South Carolina and Virginia. Texas, Maryland, Alabama and Louisiana are farther down the scale, but still in the upper half of the states. Lower in the scale are, in order, Tennessee, West Virginia, Kentucky, Georgia and Mississippi. The last named is thirty-sixth in the order of states (excluding the District of Columbia), with a ratio of 110.

The map of the United States will show that the nine lowest states, Oklahoma, North Dakota, Arkansas, Kansas, Illinois, Missouri, Iowa, Nebraska and South Dakota, are clustered in a block in the central portion of the country. One can only conclude that, for reasons which are common to them, this group of states are not attractive to new practitioners and that there is a movement away from them and toward states like California and Florida. The implications of the data for this group of states are without doubt serious.

When the triple columns of the chart are studied separately, it is seen first that for all of the geographic divisions of the states, the percentage of former practitioners who will return is high, although these men will not all go back to their former communities. In only eight states does the percentage fall below 75, but it should be noted that five of the states—Iowa, Missouri, Nebraska, North Dakota and South Dakota—are located in the same section of the country. Where the men who are not returning to their old states hope to go has just been indicated. What the reasons are was not revealed by the questionnaire, but economic opportunities and climate are obviously important factors.

A somewhat different pattern is in evidence for new graduates and former holders of full-time positions who intend to enter practice (column 5), although again the relative number who have the West North Central States in mind is small as compared with those considering other sections of the country. For this group of states, the total number of new practitioners equals 20 per cent of the number who entered service from practice. The percentage is also relatively low (22) in the adjoining East North Central States. It is highest in the New England and South Atlantic States (51 and 54). In four sections of the country, the Middle Atlantic, East and West South Central and Mountain States, the percentage is about 35, which is approximately the ratio in the whole sample of new practitioners to those who were in private practice previously.

The totals in the last column of Table 2 show that for all except seven states, the returning number exceeds the number who left; but, in those states where this excess is only a few points, there will still be a proportionate loss of dentists; that is to say, these states by comparison with the national average will not be receiving a "fair" share of returning dentists. Moreover, there is the additional problem of replacing practitioners who died or retired in the war years. Each state is its own best judge of the significance and portent of these data, and what, if anything, can be done about them. Again, these are estimates, and some limits of error are to be assigned to them. The smaller the state, the wider these limits should be.

Size of City

A frequently employed gage of the unequal distribution of dentists, and of all classes of medical personnel and facilities, is the population size of the city of practice. Hence, the inclusion in the survey of a question on this point. The question was asked only of those not returning to former localities and of those entering practice for the first time. For the others, community of practice was named on the questionnaire and its actual size could be determined and tabulated.

Data for the officers returning to for-

mer communities and for those seeking new communities were combined to obtain the distribution by size of city for all the men entering private practice (Table 3). (This was shown as Table 6 in "General Findings.") In the group as a whole, 10 per cent are going to cities with less than 5,000 population, 28 per cent to cities of 5,000-25,000 population, 24 per cent to cities of 25,000-100,000, and 38 per cent to cities of 100,000 or more. A comparison of Groups A and B reveals that a relatively larger number of the new men are going to middle-sized cities. In light of the fact that most of the officers in Group A are returning to former communities, the differences between the groups seem to indicate a trend among new practitioners away from the largest and smallest communities.

Two questions come to mind in connection with the size of the city: How will this distribution of returning dentists affect the over-all distribution of dental practitioners? What will be the relationship between distribution of the population and distribution of dentists? The answers can be approximations only, since the permanency of the shifts that have taken place in the population is unknown and data are not available on the wartime movement of civilian dentists. The data on dentists in service are based on a sample of a third of the whole dental officer population, and even among these the best laid plans may for many not be realized.

The distribution of the population according to the Census of 1940 and of dentists in 1941 are employed for these estimates. A sample of eight states shows the percentage distribution of practicing dentists to have been somewhat as shown in Table 4.

By comparing the distribution of practitioners with that of returning dental officers (Table 3), it will be seen that the percentage of dentists in the smallest and largest cities will be reduced and that there will be corresponding increases in the intermediate-sized cities. Rough calculations show that the percentage in the smallest cities will be reduced to twenty-one. (Deaths and retirements during the war years have been assumed to be equally distributed among the different city sizes.)

A comparison of the distribution of dentists with that of the whole United States population in 1940, shown above, reveals that the redistribution of dentists who are separated from service will intensify present inequalities, particularly in relation to rural areas. The situation may not be so dark as the foregoing figures would indicate. Included in the population of cities under 5,000 is the third of the population who live in unincorporated rural territory, on the farms of the nation. Where these people go for their dental care, and, therefore, the

Table 3.—Percentage Distribution of Dental Officers by Size of City of Intended Practice

Size of City (Population)	All Dental Officers	Status Prior to Active Service		
		A	B	C
		Private Practice	Dental School or Internship	Salaried Position
Under 5,000	9.6	10.9	5.1	6.0
5,000-25,000	28.0	25.9	34.3	44.7
25,000-100,000	24.2	22.9	29.2	23.3
100,000 and over	38.2	40.3	31.4	26.0
Total	100.0	100.0	100.0	100.0
Number of officers giving information	6,424	4,998	1,276	150

*Table 4.—Percentage Distribution of Practicing Dentists**

City Size (Population)	Percentage of Practicing Dentists†	Distribution of Population
Under 5,000	24	47
5,000-25,000	18	13
25,000-100,000	15	11
100,000 and over	43	29

*In sample of eight states.

†Committee on Economics: Distribution of Dentists in the United States. Chicago: American Dental Association, 1942.

distribution of their dentists by size of city, is not known. It *is* known that our cities of any size serve as trade centers for surrounding areas and that dentists draw a high proportion of patients from beyond the city's official limits. The 40 per cent or more of the dentists in cities of more than 100,000 population serve far more than 29 per cent of the total population.

The problems involved in the distribution of dentists are many and complex, and a little beyond the scope of the study. It should be evident that as long as dentists establish their offices without guidance as to the wisdom of their choice and without reckoning the needs of the population, just so long will the unequal distribution of dentists continue.

Interest in Full-Time Positions

It is only fair to point out that these data may overestimate the actual number who will return eventually to practice, since quite a number of the officers who said that they would enter private practice also expressed an interest in a salaried position or staying in service. The size of this group is shown in Table 5. Of the number who said they intend to practice, 11 per cent are willing to remain in service—supposedly if rank, opportunity and the like are satisfactory —4 per cent would take a full-time position in industry and 5 per cent are interested in both. Twenty per cent of the remainder would accept a position in a state or local health department or a school clinic, but most of these have, in all likelihood, only a part-time position in mind. It is interesting to observe, as between Groups A and B, that the percentage interested in remaining in service in the former is twice that in the latter, while the percentage of those interested in an industrial position is slightly higher in the latter. (This difference is not statistically significant.)

Purchase of Equipment

The matter of office equipment is obviously associated with private practice, and such information on equipment as was obtained from the survey is therefore included in this paper. The question was presented in the following form:

15. Number of complete dental outfits now owned—

(a) Additional items required:

Chairs— Units— Engines— X-ray machines—

Other (specify)—

Through inadvertence, the question was so placed on the questionnaire as to appear applicable only to dental officers who entered service from private practice. As a result, it was overlooked by almost three-fourths of the men who had never practiced, but who intend doing so after the war. Moreover, the proportion of those who came from private practice and who did not specify any items in part (a) of question 15 was also high. There was no provision made for specifying "None." In the analysis of the data, two assumptions have been made: (1) that dental officers who own outfits and did not specify any items in question 15(a) will not require additional major equipment, and (2) that those who do not own outfits and did not answer the question will want to purchase an outfit on entering practice.

At the bottom of Table 6 are shown the number of dental officers in the

Table 5.—Percentage of Dental Officers Returning to Private Practice Who Expressed Interest in Full-Time Positions

Kind of Position	All Dental Officers	Status Prior to Active Service		
		A	B	C
		Private Practice	Dental School or Internship	Salaried Position
Active service with federal government	11.2	12.5	5.6	20.2
Full-time position in industry	3.9	3.7	4.4	5.7
Active service or full-time position in industry	4.7	5.3	1.6	14.0
Not interested in above, but interested in position with state or local health department, clinic, etc.*	20.2	17.2	30.4	19.7
Number of dental officers returning to private practice†	7,057	5,281	1,583	193

*Officers were not asked to differentiate between full-time and part-time in connection with such positions.

†Includes 267 dental officers who were undecided about entering private practice.

sample who are presumably entering practice, and the numbers in this group who do and do not own outfits. Of 7,057 officers in the group, 4,511, or 64 per cent, already own an outfit. In Group A, the officers who come from private practice, 84 per cent kept their dental equipment, but almost a third of these men indicated that they will require additional outfits.

Table 6 itself shows the percentages that will require each of the items specified in the questionnaire. Of the group who own an outfit, 30 per cent will want chairs and units and about 22 per cent will want x-ray machines. In the group without outfits, the percentages are close to 100. This is to be expected. The small number who definitely do not want these items have very likely made arrangements to obtain or make use of other dentists' equipment.

To obtain an estimate of the relative number in the whole group who will want new dental outfits on going into practice, it seems reasonable to employ the percentage checking the item "chairs." Approximately the same number checked the item "units" and a somewhat smaller number checked "x-ray machines." On this basis, about 55 per cent of the dental officers entering practice will require outfits, 36 per cent who do not own an outfit now and 19 per cent who do. One can estimate, therefore, that the returning dentists will be placing about 11,000 orders for dental outfits. From whom and how they will be obtained is undetermined at this moment.

An answer to the last part of the question on equipment, which asked that other required items be specified, was made by only a sixth of those entering practice. Out of 1,217 replies, 24 per cent simply specified a complete outfit. Such replies were treated by checking each of the items specifically mentioned

Table 6.—Percentage of Dental Officers Entering Private Practice Who Will Require Specified Items of Equipment

Item of Equipment	All Dental Officers Entering Private	Dental Officers Owning Complete Outfit	Dental Officers Not Owning Complete Outfit
Chairs	54.6	30.0	98.2
Units	54.2	29.6	97.8
X-ray machines	49.1	22.4	96.5
Number of dental officers returning to private practice*	7,057	4,511	2,546

*Includes 267 dental officers who were undecided about entering private practice.

in question 15a. The items most frequently mentioned by the others were cabinets (by 32 per cent), sterilizing equipment (14 per cent), laboratory equipment (11 per cent), instruments (11 per cent), furniture (5 per cent) and lights (4 per cent). It is obvious that these percentages understate the true numbers who will want such items of equipment, since they are essential appurtenances of practice. It seems more reasonable to assume that the same percentages wanting complete outfits will want the items mentioned. The number of officers who specified equipment employed in specialties or by relatively few dentists was too small to offer much as to reliability.

Summary

1. Ninety-three per cent of the dentists in the armed forces desire to enter private practice on separation from service. This figure includes 3 per cent who indicated some indecision about practicing.

2. The percentage indicating a return to practice was 96 in Group A, 95 in Group B and 50 in Group C.

3. In Group A, 62 per cent intend to return to their former localities, 22 per cent are going to new communities and 9 per cent may or may not seek new places of practice.

4. Most former practitioners are returning to the states in which they practiced prior to service. The trend for those who are changing states is toward California and other western states and Florida. (Licensure has not been taken into consideration.)

5. A somewhat similar trend is observed among the new practitioners, mostly recent graduates, although the proportion who intend going to the New England and Middle Atlantic States and some of the other South Atlantic States is also high.

6. The distribution of dental officers by size of city of intended practice indicates that prewar shortages in rural areas will be accentuated by the trend toward cities of 5,000-100,000 population.

7. Of the group indicating a return to practice, 11 per cent expressed a desire to remain in service, 4 per cent would be interested in a full-time position in industry and 5 per cent are interested in both.

8. It is estimated that about 55 per cent of all the men entering practice will require or want complete or new dental outfits.

Conclusion

That nearly all dental officers would say on the questionnaire that they will enter private practice was to be expected. What will prove of concern and value is the information on trends in the location of former and new practitioners. As the data have shown, some sections and states will receive a large number of returning dentists, relative to the former number of practitioners, and others face a serious loss in dental personnel.

This can be demonstrated in a general way by comparing the prewar ratio of dentists to population in each region with the ratio of returning veterans to practitioners who entered service. The

Table 7.—Ratios of Dentists to Population and of Returning Veterans to Practitioners

	Persons per Dentist (1940)*	Returning Dentists per 100 Practitioners Who Entered Service
Pacific	1,290	148
Middle Atlantic	1,457	121
West North Central	1,591	95
East North Central	1,630	107
New England	1,674	151
Mountain	2,171	158
South Atlantic	3,001	164
West South Central	3,320	129
East South Central	4,780	122

*O'Rourke, J. T.: Analysis of Number and Distribution of Active Dentists in United States. J.A.D.A. 31:1097, August 1, 1944.

ratios, in order of persons per dentist, are shown in Table 7.

Of course, the data conceal the fact that there are marked inequalities of distribution within regions and within states. Nevertheless, there is something to be learned from the regional effects that the redistribution of returning dentists will have. Regions with ratios (in the second column, Table 7) close to the national average of 124 can be considered as maintaining their prewar position. This will be true, then, in the Middle Atlantic and East and West South Central States, but the two latter sections have the fewest dentists relative to population and need additional practitioners. On the other hand, the disparity between the Pacific Region, which has the most dentists relatively, and the rest of the country is apparently to increase. The East and West North Central States, which are to lose dentists, can very obviously ill afford to do so.

Morrey, in a recent paper,[2] has pointed out the public's growing awareness and appreciation of the values of mouth health and adequate dental service. The benefits received by servicemen "will be transformed into desires and into demands for better dental care, both for themselves and for their families . . . for the next decade at least, the demands for dental service will materially exceed the supply." Certainly, the dental profession should make what effort it can to equalize that supply throughout the nation. The new practitioners, who are for the most part men who graduated from dental school just previous to and during the war years, and former practitioners seeking a change of community are the logical groups to be influenced in these efforts.

PERIODONTIA: DIAGNOSIS AND TREATMENT

Lester B. Older, D.D.S., Union City, N. J.

The statement that more teeth are lost through periodontal disease than from any other type of dental condition is true. With the increased knowledge of the fundamentals of bone growth, as well as tissue growth and regeneration, the dental practitioner should exert every effort to treat and save such teeth instead of extracting them.

When the question arises "Can pyorrhea be cured?" the following statement by Merritt[1] should be answer enough:

> "Cure" does not mean a restoration to normal; that is, to "the ordinary or usual condition," but "a restoration to health," which is the dictionary definition of "cure." A decayed tooth, for example, cannot be restored to normal, but it can be cured of the carious process, and, at the same time, be restored to health, which, after all, is the end of all treatment.
>
> With this then as the definition of "cure" (which is the correct one), it can be said, without fear of successful contradiction, that periodontoclasia is a curable disease, though, like many other diseases, it may reach an incurable stage if treatment is too long deferred.

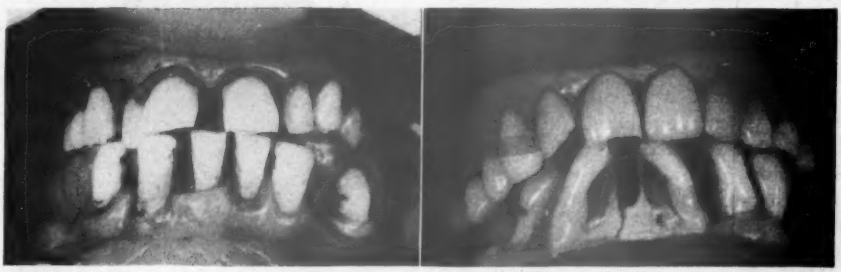
The cure of pyorrhea depends on diagnosis of the case. The operator must be capable of determining by means of x-ray and clinical examination, and pocket depth, whether the condition is incipient (Fig. 1), advanced (Figs. 10*a*

1. Merritt, A. H.: Is Periodontoclasia Curable? J.A.D.A., 21:879, May 1934.

2. Morrey, L. W.: Dental Personnel. J.A.D.A. 32:131, February 1, 1945.

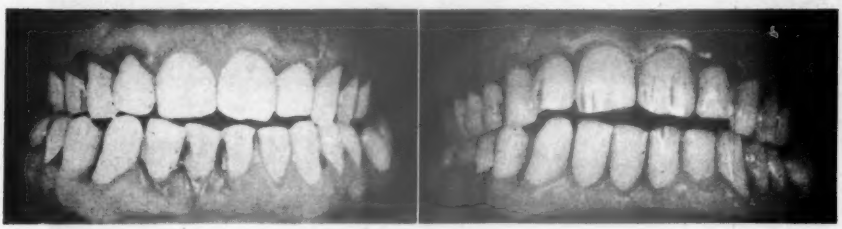
a *b*

Fig. 1.—*a*, marginal gingivitis, from lack of oral hygiene and nondetergent diet. There is no bone destruction and the condition can be cured without much difficulty. *b*, marginal gingivitis, from nonocclusion. The patient, a girl aged 21, was unable to bring the anterior teeth closer together than is shown. The posterior teeth occluded first, open bite resulting. A strict regimen of oral hygiene and gum stimulation had to be maintained after office treatment was completed.



a *b*

Fig. 2.—*a*, advanced pyorrhea, with prognosis unfavorable. All teeth had to be extracted. *b*, advanced case of periodontoclasia (hopeless) of lower teeth, with extreme gum and bone destruction. The bridge of calculus is to be noted.



a *b*

Fig. 3.—*a*, hypertrophic gingivitis, without bone destruction. *b*, case after conservative treatment.

and 16*a*) or hopeless (Figs. 2*a* and *b*). Naturally, a hopeless case can never have a successful result, and it would be a reflection on the operator if treatment was attempted.

The operator should be able, with his diagnostic aids, to determine whether the condition is strictly a disease of the gingiva, such as hypertrophic gingivitis (Fig. 3*a*), or it is a gingivitis superimposed on a periodontal bone destruction (Figs. 4*a* and 6*a*). In other words, the

a *b*

Fig. 4.—*a*, hypertrophic gingivitis in conjunction with pyorrhea. X-rays revealed the depth of the pocket and the extent of the destruction. (Fig. 5.) *b*, case after conservative treatment. There is gum recession, but no infected hypertrophic tissue. (Compare with Figures 11*b* and 17*c*.)

latter condition is pyorrhea complicated by a disturbance and destruction of the interproximal or labial and lingual gingivae.

If the condition has been diagnosed as hypertrophic gingivitis, the etiology should be ascertained; i. e., whether local or systemic. To eliminate the possibility of a systemic condition, further diagnostic tests are necessary. A complete blood count and hemoglobin test should be made to determine whether blood dyscrasia is present. A urine analysis and a glucose tolerance test will reveal any diabetic condition. Whether glandular dysfunction is present must be determined, and tests for syphilis should be made. If any of these systemic disturbances are present, the necessary medical treatment must be instituted before or during local treatment. If none of these conditions are found, we must assume that the hypertrophic gingivitis is

Fig. 5.—Depth of pocket and extent of destruction in case shown in Figure 4.

a *b*

Fig. 6.—*a*, periodontoclasia similar to condition in Figure 4*a*. Deep pockets are present and the gingivae are swollen. *b*, case after conservative treatment. The gums are healthy and recession can be noted.

purely local, the result of (1) traumatic occlusion (Fig. 12*a*); (2) malocclusion; (3) absence of teeth; (4) faulty restorations; (5) nonocclusion (Fig. 1*b*); (6) malposition of teeth (Fig. 13); (7) faulty nutrition or unbalanced diet; (8) lack of oral hygiene; (9) improper brushing and stimulation, and (10) formation of dental calculus.

Should the hypertrophic gingivitis be prevalent throughout the mouth, it is advisable to carry out the treatment in stages and divide the mouth into work areas, treating each particular area thoroughly and carefully until the mouth has been covered and the desired result obtained.

The treatment is definitely conservative, using suitable scaling and curetting instruments to remove every trace of calculus, as well as the infected interproximal or necrotic gingival tissue. The operator must be careful not to disturb the healthy gingival fibers through injudicious scaling or curetting. Copious bleeding of the involved gingivae during the first instrumentation is advantageous as it allows a disgorgement of the congested blood vessels and relieves stasis, which is usually present.

After each scaling, some medication, either escharotic or astringent, is necessary. There are many ideas on this subject and several forms of medication are now being successfully used. I have found the application of 50 per cent tannic acid in glycerin as it has been described by Blass[2] to be of exceptional

Fig. 7.—Condition shown in Figure 6.

Fig. 9.—Pocket depth in case shown in Figure 8.

a *b* *c*

Fig. 8.—*a*, hypertrophic gingivitis of long standing, due mainly to malposition of left central incisor. A combination of drugs and electric cautery was necessary to remove hypertrophied tissue. X-rays revealed pocket depth. (Fig. 9.) *b*, appearance of tissue immediately after use of cautery. Hemorrhage and sloughing of tissue can be noted. *c*, appearance of tissue several weeks after treatment.

2. Blass, J. L.: Chemicotherapy and Physiotherapy as Adjuncts in Conservative Treatment of Periodontal Disease. J.A.D.A., 30: 267, February 1, 1943.

value when it is employed as follows:

In localized or generalized hypertrophy accompanied by edema, the solution is applied under the tissue flap on a rope of lens paper. It is allowed to remain for ten minutes and is followed with a mouthwash of hypertonic salt solution used every two hours for three or four days. The latter, as recommended by Box, is made by dissolving two and one-half teaspoonfuls of salt in a glassful of water.

atomic oxygen. Orban[3] adds 1 drop of a 5 per cent solution of sodium bicarbonate to 10 drops of 30 per cent solution to neutralize it and then applies it by means of cotton fibers to the inflamed area for a maximum of twenty seconds. As this medicament is applied, foaming occurs and oxygenation of the tissue is accomplished. I have found this to be most useful in the treatment of marginal

PROCEDURES IN CONSERVATIVE AND SURGICAL TREATMENT OF PERIODONTAL DISEASE; ADVANTAGES AND DISADVANTAGES

Conservative	Surgical
1. Topical anesthesia to area	1. Local anesthesia
2. Thorough scaling and curettage of area	2. Flap operation or gingivectomy
3. Medication	3. Thorough scaling or curettage
4. Home treatment—brushing and stimulation of gums	4. Suturing
5. Balanced diet	5. Surgical cement pack
6. Follow-up care	6. Splinting devices
	7. Home treatment—brushing and simulation of gums
	8. Balanced diet
	9. Follow-up care
Advantages	**Advantages**
1. Less operative and postoperative pain	1. Treatment of area completed in one session, no repetition ordinarily
2. Less tissue shrinkage	2. Open area affords greater accessibility
3. Quicker healing	3. Complete eradication of pocket
4. Less trauma and practically no swelling of tissues	
5. Bleeding minimized	
Disadvantages	**Disadvantages**
1. Continued repetition of treatment necessary	1. Greater postoperative pain and discomfort, which may interfere with patient's daily routine
2. Accessibility reduced during scaling	2. Greater shrinkage
3. Complete treatment requires more time	3. More trauma
	4. Slower healing

This treatment will cause a shrinkage of the edematous tissue and eliminate the hypertrophy. If the case is stubborn, it is permissible to use the electric cautery and carefully cauterize the edematous tissue at its apex and allow it to slough off. Then the tannic acid treatment may be repeated. (Fig. 8*b*).

An excellent medicament in the treatment of inflamed gingival tissue is 30 per cent hydrogen peroxide, which, when applied to the tissue, gives off a nascent

gingivitis. The disappearance of the inflammation and the return of normal tissue tone is evidenced within a few days.

True periodontoclasia is usually evidenced clinically in three different ways.

Type 1. As *schmutz* pyorrhea, or filth pyorrhea, which has, as a clinical picture, extremely heavy supragingival deposits

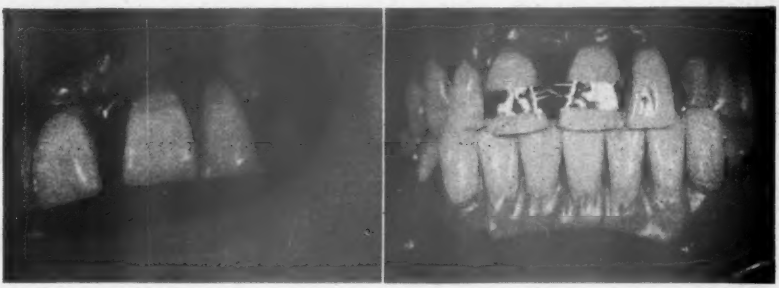
3. Orban, Balint: Action of Oxygen on Chronically Inflamed Gingival Tissue. J.A.D.A., 29:2018, November 1, 1942.

Fig. 10.—Advanced pyorrhea necessitating surgical treatment. X-rays revealed the pocket depth. (Compare Fig. 11.)

reality, marks a rapid degeneration of the bony support and may be overlooked entirely from the clinical picture alone, as the gingiva has a normal and healthy appearance. The extent of the destruction is determined through diagnostic tests.

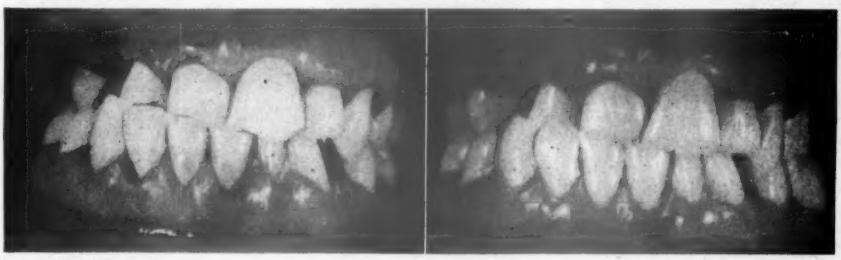
Type 3. As a combination of gingivitis and bone destruction. Clinically, the appearance is similar to that of any hypertrophic gingivitis, but, in addition, bone resorption has taken place around the root surfaces.

These pyorrhea conditions, although



a *b*

Fig. 11.—*a*, flap operation in case shown in Figure 10. All granulation and necrotic tissue, as well as calculus, is removed when the area is opened. *b*, extent of resorption in surgical treatment, four weeks after operation. The orthodontic splinting device was used to stabilize the loose left central incisor.



a *b*

Fig. 12.—*a*, hypertrophic gingivitis from malocclusion crossbite (traumatic). *b*, result of conservative treatment.

of calculus as well as other extraneous matter in and about the interproximal tissues. (Fig. 2*b*).

Type 2. As a condition which, in differing clinically, have about the same alveolar bone condition, the amount of bone destruction depending on the severity and duration of the disease.

Fig. 13.—Marginal gingivitis, in young boy; caused by lack of oral hygiene and malocclusion of lateral incisor.

vitality. The combined results of all of these tests should inform the operator as to prognosis.

There are two methods of approach in the treatment of periodontoclasia: the conservative and the surgical. The latter can be subdivided into conservative and radical measures.

The conservative treatment comprises thorough cleansing of the involved gingivae by means of scalers and curets. It is similar in scope to the treatment of hypertrophic gingivitis as described pre-

a *b* *c*

Fig. 14.—*a*, advanced pyorrhea and bone destruction affecting virtually two-thirds of root surface in upper and lower anterior teeth. X-rays reveal the depth of the pocket. (Fig. 15.) *b*, orthodontic wire splint in place to immobilize loose right lateral incisor during treatment. *c*, condition three months after conservative treatment; showing amount of recession and creation of tissue attachment. The recession is slight as compared with that in Figures 11*b* and 17*c*, cases treated surgically.

a *b* *c*

Fig. 15.—Depth of pocket in case shown in Figure 14.

All above-mentioned diagnostic tests pertaining to gingivitis are also applicable to periodontoclasia.

Further tests are made in order to determine the pocket depth, the amount of tooth mobility and the degree of

viously, but the instrumentation penetrates deeper into the pockets, thus removing all necrotic tissue and calculus. Chemotherapy is instituted to remove epithelial remnants in order to allow shrinkage and a possible reattachment

of the gingival tissue to occur. I stress the fact that all deposits whether gross or fine must be removed, as healing will not take place unless this is accomplished (Figs. 8*c* and 6*b*).

Conservative surgical methods vary, but the result is the preservation of as much tissue as possible. The flap operation[4, 5] (Fig. 16*b*) is used in teeth easily

Orban[6] presents a method of gingivectomy by chemotherapy using paraformaldehyde in a concentration of 5 per cent by weight in a zinc oxide paste and applying it to the pockets.

Barkann's[7] use of a camphor and phenol mixture followed by the scraping of the tissue wall is also presented as a conservative surgical measure.

a *b* *c*

Fig. 16.—*a*, extensive bone destruction and pocket depth in upper left lateral and distal surface of upper left central incisor. The depth is evident in the x-ray film. (Fig. 18.) *b*, flap operation exposing all infected tissue. *c*, double ring cast gold splint used to stabilize loose lateral incisor with strong cuspid as abutment.

a *b* *c*

Fig. 17.—*a*, splint on model, lingual aspect. *b*, healing of surgical lesion and recession after four weeks, splint temporarily removed. *c*, healing and recession after six months.

reached, especially in the lower or upper anterior regions. It is accomplished by incising the tissue interproximally and turning the flaps back labially and lingually, and thoroughly cleansing the exposed pockets with suitable instruments. The tissue is now sutured and covered with surgical cement to induce healing and prevent pain.

Radical surgical treatment[8] consists of removing gingival tissue by means of surgical instruments to the full depth of the pocket in all involved areas, interproximally, buccally, labially and lingually. All necrotic tissue is curetted and calculus removed when all the

4. Kirkland, Olin: Modern Technics in Surgical Periodontia. J.A.D.A., 29:817, May 1942.

5. Older, L. B.: Use of Surgery and Splints in Treatment of Periodontal Disease. D. Digest, 50:111, March 1944.

6. Orban Balint: Gingivectomy by Chemosurgery. J.A.D.A., 30:198, February 1, 1943.

7. Barkann, L.: Conservative Surgical Technic for Eradication of Pyorrhea Pocket. J.A.D.A., 26:61, January 1939.

8. Ward, A. W.: Technique for Surgical Eradication of Periodontoclasia, in Miller, S. C.: Text Book of Periodontia. Philadelphia: Blakiston Company, 1938, p. 153.

pocket tissue has been eradicated. When necessary, bone is removed to make the alveolus smooth. A surgical cement pack is used in order to protect the field of operation.

In many cases, after conservative or surgical treatment, it becomes necessary to splint the teeth in order to immobilize them while tissue healing and reattachment are taking place (Figs. 11*b*, 14*b* and 16*c*).

Several types of splints have been devised, both removable and stationary. I

Fig. 18.—Depth of pocket in case shown in Figures 16 and 17.

have found that the use of a combination metal acrylic removable splint,[8] if worn for a period of six months or more, will aid greatly in immobilization of the teeth involved.

In the case of a single loose tooth, a double ring cast gold splint temporarily cemented to a strong abutment tooth is also valuable to obtain stability (Fig. 16*c* and 17*a*).

Other splinting devices in use are orthodontic wires ligated to the weak teeth, using strong teeth as abutments (Fig. 14*b*), a grassline ligature, assembled and soldered three quarter crowns and all cast removable splints.[9]

The correction of local conditions may be achieved by (1) relieving traumatic occlusion; (2) balancing the occlusion; (3) replacing all missing teeth in functional occlusion; (4) prescribing a balanced diet which is high in vitamins and minerals and self-cleansing nondetergent foods, and (5) teaching the patient the proper method of toothbrushing and gingival stimulation.

The patient should be strongly advised that home care and a periodical check up are essential and on such cooperation rests the future success of treatment.

Conclusion

A satisfactory end-result regardless of method of treatment is evidenced by shrinkage of the pocket, reattachment of tissue and a healthy appearance of the gingivae. Conservative treatment will prove of greater value if used wherever possible, as it preserves much more gingival tissue than any of the surgical procedures. (Compare Figures 8*c* and 17*c*.) When indicated, surgical treatment should be given without hesitation, provided the patient is willing to sacrifice appearance (changes ensuing from extreme shrinkage) to a healthy gingival condition.

It can be readily understood that, with a regimen of correct diagnosis and treatment, and with patient cooperation, pyorrhea can be cured, pain alleviated and teeth preserved indefinitely.

2115 New York Avenue.

9. Saghirian, L. M.: Electrosurgical Resection in Treatment of Periodontal Disease. J.A.D.A., 30:1666, November 1, 1943.

PERIODONTIA—SOME FACTS CONCERNING OCCLUSAL HABIT NEUROSES

Benjamin Tishler, D.M.D., Boston, Mass.

The dental profession is indebted to Stillman for bringing to its attention in an emphatic way the injurious effects of faulty occlusion on the periodontal tissues, for every branch of dental practice, with the exception of oral surgery, has benefited by this knowledge. It was as a practicing periodontist that he realized the injury that malocclusion could inflict on the tissues, and the members of the American Academy of Periodontology, organized thirty years ago, and of which he subsequently became president, greatly assisted in disseminating this information. I am one of a group of periodontists who believed with Stillman that traumatic occlusion, a term which he introduced to describe the force, but which I believe could better be called occlusal traumatism, was a primary factor in the etiology of periodontosis. Later research caused him to change his mind, it having been proved definitely to be a secondary factor, the etiology of which is not yet understood.

Among the exciting causes of periodontosis that involves a faulty occlusal contact is a habit neurosis, a pathologic condition that is more common than generally believed. It is practiced during periods of mental stress, abstraction or sleep and it develops when the nervous system is sensitive and whenever there is a full, or nearly full, natural denture.

It should be borne in mind that not all nervous persons with a full set of natural teeth that are not in good occlusion acquire a nervous occlusal habit, but the phenomenon is not at all unusual and is a diagnostic factor in periodontosis. It is frequently overlooked by practitioners even though they possess a good knowledge of dental practice. These practitioners cannot understand why so many perfectly sound teeth become mobile at a comparatively early age, in many instances, although the tone of the periodontal tissues is sufficiently affected by the unusual occlusal stress to occasion mobility. The condition is often attributed to traumatic occlusion, without a realization that it is due to an occlusal habit neurosis, about which, as a consequence, nothing is done. The constant practice of this habit will, in many cases, cause extreme discomfort, and occasionally pain, long before mobility becomes marked.

Careful grinding of the areas of contact will entirely relieve any mobility. An outstanding clinic case was that of a girl of 14 who reported a sharp pain in the region of the right mandibular cuspid. Examination disclosed that the cusp point of this tooth and that of the maxillary cuspid were entirely worn away at that early age, by constant attrition from pushing the lower jaw forward and grinding the teeth together. Both were longer than the approximating teeth.

Not infrequently, the occlusal surfaces of natural teeth in the mouths of persons of middle age are so badly worn that the cusps of the molars and bicuspids are similarly destroyed and the edges of the incisors ground away two-thirds of their original length by the constant grinding practiced during sleep or periods of abstraction. The masticatory muscles of these patients become overdeveloped from the excessive use imposed on them by the habit, and the pressure created causes resorption of

the alveolar process, the rapidity depending on the amount of this force, which varies in different individuals, and the density of the tooth structure and that of the process.

That persons aged 25 to 30 sometimes have well-calcified teeth is shown by the lack of approximal fillings and the presence of a few small, often tiny, fissure fillings. The molars or bicuspids are frequently very mobile because of the loss of supporting bone, but the occlusal wear is so slight that it is readily overlooked unless the operator is familiar with the problem under discussion.

It is repeated that a habit neurosis will not always develop when the occlusal relationship is poor because nervous temperaments vary. It is apparent that susceptibility is the deciding factor, just as is the case in the development of any bodily disturbance. The same irritant in two individuals will result in disease in one and not in the other. When an occlusal habit neurosis develops, it is usually found that the teeth have a marked anterior overbite and long, narrow bicuspid and molar cusps, which may or may not be in centric relationship. Periodontists call this condition a locked occlusion because of inability to move the mandible when it is in centric occlusion. Sometimes, it is found that only the cuspids are longer than the approximating teeth, which are in functional occlusion, and a habit of grinding these teeth together develops, with the result that the points are worn entirely away as in the case already cited. There is always an accompanying loss of labial gingival tissue in these cases, the margin of which may become thickened and more marked over the maxillary than over the mandibular tooth. The fact which deceives practitioners is that, when teeth are in centric relationship, pathologic results are not anticipated.

Periodontists have long made a distinction between what is believed by many to be a normal occlusion and what they consider to be functional occlusion. In fact, they were the first group of practitioners to stress this distinction. It should be borne in mind that although the maxillary and mandibular teeth are in correct relationship when they are in the centric position, mobility often develops later, unless the teeth are in functional occlusion, and "functional occlusion" is one that will not result in trauma no matter in which direction the teeth are moved. Many orthodontic cases have been dismissed by the operator with the teeth in centric alinement, but, ten or more years later, the time depending on the resistance of the patient, mobility of one or more teeth develops because of an occlusal habit neurosis and consequent resorption of the alveolar process.

Faulty occlusal habits of this kind cause the susceptible to either grind or press the teeth together because the mandibular incisors rest in or near the basilar pit and the long biscuspid and molar cusps are so interlocked that the posterior teeth cannot be moved buccolingually, and the effort to free them when they are at rest results in labial and buccal gingival wasting. Wasting of the lingual gingiva is not so frequently observed as that of the labial and buccal, owing, no doubt, to the effort to move the mandible in a labial or buccal direction, which causes pressure against the lingual surfaces of the teeth involved. Box has described the force as similar to that of a lever, the cervix of the tooth opposite the point where it is applied acting as the fulcrum. The constant pressure at this area is responsible for the recession of the gingival tissue. I have made a study of this interesting condition for many years and wrote an article referring to it.[1] The present writing presents the subject in greater detail.

To cite two interesting examples of

1. Tishler, Benjamin: D. Cosmos, 70:690, July 1928.

grinding or pressing the teeth together and the sequelae, from those that have been observed, the following is offered.

A woman, aged 23, with an excellent set of well-cared-for teeth, was referred to me because of an uneasy feeling involving the maxillary incisors. The teeth were in centric relationship, but an examination disclosed pockets on the lingual surface of the maxillary central and lateral incisors about 4 mm. deep. Further examination showed that the incisal edge of these teeth and that of the mandibular teeth were worn to a sharp inclined edge, just as the cutting edge of a pair of scissors is ground. The case history disclosed that the condition was due to a habit of continually sliding the mandible forward. Constant attrition had worn these teeth to a sharp edge. Connected with this case was nervous exhaustion and a breakdown two years later, which lasted for several months.

A man, aged 41, whose teeth were also in centric relationship, had a soreness about the third molars after he had driven his automobile for a long distance, due to clenching of the jaws as he became fatigued, the pressure causing pericementitis. This man became incurably insane fifteen years later.

It is again repeated that it should not be inferred from the reference to these cases that the development of an occlusal habit neurosis always has serious constitutional results: quite the contrary. They are unusual in my experience and are presented to show the relationsip between malocclusion and the development of a neurosis in a highly sensitive person. The person who grinds his teeth continually or presses them together was probably a confirmed thumbsucker or tongue-presser during childhood or developed some other habit equally bad.

It is strange how little attention is given to this not infrequent condition by the profession, owing, no doubt, to a lack of knowledge and appreciation of the fact that it is responsible for the loss of teeth that, in many cases, are not affected by caries. Many such teeth have been extracted because they became loose and were a source of discomfort. Patients who come under the care of a periodontist frequently report a loss of teeth due, in many instances, to the development of an occlusal habit neurosis, which the general practitioner failed to observe. The first procedure of a periodontist after teaching gingival stimulation with the toothbrush and interdental stimulator is the correction of occlusal stress.

358 Commonwealth Avenue

CLASSIFICATION AND REMOVAL OF IMPACTED MANDIBULAR THIRD MOLARS

Jack M. Kaplan, D.D.S., Kelly Field, Texas*

There are in use, at the present time, many technics for the removal of impacted third molars, ranging from the more conservative and complicated one of complete sectioning of the tooth, with no bone loss, to the more radical and drastic one of complete removal of the tooth wherein as much as 1 inch of bone is removed in an area where the buccal plate is as thick as one quarter inch. Objections to these two extreme procedures are based on the small size of the operating field, resulting in a lengthy and difficult operation with the former technic, and on excessive trauma-

*Major (DC) U. S. Army.

tization of investing bony and soft tissues with resultant long periods of postoperative pain and treatment with the latter. In the following paragraphs, there will be presented a classification and a technic that is considered a combination of the two previously mentioned procedures. The principles and technic are so systematic and simple that their employment should bring impaction operations within the scope of the average practitioner. They have been in use for a number of years with good results. Postoperative pain and treatment have been kept to a minimum, the average number of postoperative visits being approximately two.

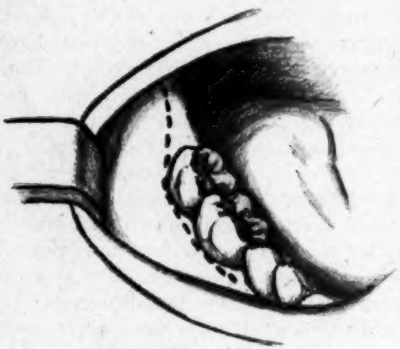


Fig. 1.—Line of incision.

Fig. 2.—Retracted flap.

Mandibular third molar impactions are grouped under three classifications, according to the findings as based on x-ray and on visual examination.

I. Investing Tissue Classification (Fig. 1).
   - A. Soft tissue.
   - B. Partial bony.
   - C. Complete bony.

II. Positional Classification.
   - A. Horizontal.
   - B. Vertical.
   - C. Angular.
   - D. Miscellaneous.

III. Root Curvature Classification.
   - A. Roots fused.
   - B. Both roots straight.
   - C. Both roots distal.
   - D. Mesial root distal-distal root straight.
   - E. Distal root distal-mesial root straight.
   - F. Mesial root distal-distal root mesial.
   - G. Both roots mesial.
   - H. Miscellaneous.

The preceding classification attempts to break down into main groups and subgroups anatomic conditions that produce all types of mandibular third molar impaction. Included in I, A are all impactions that can be corrected by simple incision of the overlying gum tissue and elevation without elimination of bone. In I, B are those wherein part of the crown is covered by bone, and extraction necessitates the removal of enough bone to release the crown. In I, C are those wherein the entire crown is encased in bone. The positional classification is self-explanatory, the description of the direction being dependent on the occlusal surface; that is, if the occlusal surface of the tooth faces lingually, it has been termed linguo-angular; if distal, disto-angular; etc. The root curvature classification is obvious, describing only the direction of curvature of the roots regardless of the type of impaction. In

other words, any of the eight types of curvature may be present in any of the subgroups of main group II. Thus, in using this classification, it is possible to place every impaction in one subgroup of groups I, II and III. With a knowledge of the combination of the three subgroups and of the principles involved in the necessary procedures to overcome each condition, systematic correction of the impaction becomes routine.

The more obvious details, such as sterilization, preparation of the patient, anesthesia and care of the instruments, will be omitted, since it is felt that, although each of these is as important as the technic, nothing new can be presented, and it is recommended that each be carried out as carefully as the operation. Much use has been made of the preoperative preparation of the patient. A good night's sleep is absolutely essential and, in order to obtain this, a mild hypnotic is prescribed. When a surgical operation of greater than average extent is to be performed, sulfadiazine is given for forty-eight hours prior to the operation, as well as pentobarbital sodium one-half hour before the operation. The mention of specific instruments will be omitted and their use will be limited to general types such as burs, pic elevators and spearpoint elevators. The specific instrument of choice is the one that, in the hands of the operator, will perform the required operation.

Naturally, the use of x-rays is absolutely essential. An adequate x-ray examination calls for both a small dental film and a lateral film of the jaw and the ascending ramus on the side of the impaction. It is necessary to have an x-ray record of the entire length of the tooth plus the surrounding bone tissue, and a true picture of the apices.

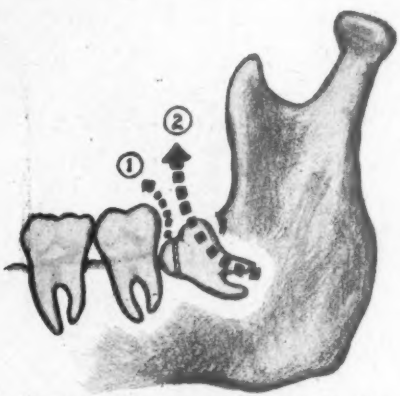


Fig. 3.—Resected mesial angle and direction of removal of angle and remaining portion of tooth.

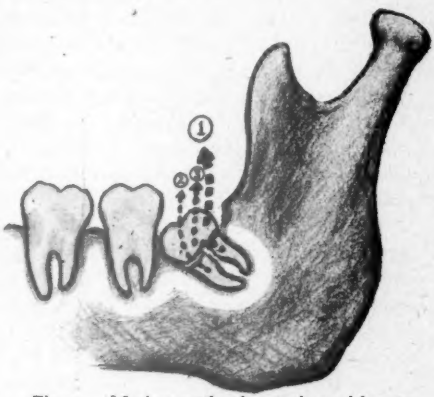


Fig. 4.—Mesio-angular impaction with root formation producing resistance to elevation; crown resected, roots separated and three segments removed individually.

The incision used in this work is different from the conventional type, composed of one on the ridge and one on the buccal aspect carried down into the buccal vestibule. The buccal incision has always been a source of severe pain during healing. In these procedures, the incision is carried from the crest of the ridge above the impaction area mesially and buccally along the free margin of the gingiva up to a point between the second bicuspid and first molar. This incision results in a wide operating field and greater area of vision, and in less pain during healing. Since, in this tech-

nic, the bone distally from the impaction area is not to be considered, care is taken not to carry the incision too far distally, causing great pain in the soft tissues of the throat, as well as extreme trismus of the mandible.

Basically and fundamentally, the removal of an impacted mandibular third molar is a three-cornered problem involving consideration of (1) the amount of bone present, (2) the angulation of the tooth and (3) the curvature of the roots. In considering the amount of bone offering resistance to removal, one prime rule is that enough bone must be removed to clear the height of greatest convexity of the crown. This is done so that if the crown is disengaged from the roots, elevation of the crown will not be hindered by bone resistance. In these procedures, it is unnecessary to eliminate bone in order to facilitate removal of the roots.

The next point to be considered is the angulation of the tooth in relation to the second molar present. If, after the height of convexity of the crown has been relieved, the crown is still trapped because of angulation, part or all of the crown must be sectioned. The amount of crown to be sectioned will be determined by the angle of the crown and, ultimately, the curvature of the roots. To illustrate: If a mesio-angular impacted tooth is being removed and, after the crown has been released from bone resistance, and through x-ray examination, it is determined that no resistance will be exerted by abnormal root formation, enough of the crown is removed so that elevation by a spearpoint elevator placed between the mesiobuccal surface of the crown and the buccal plate will clear the second molar. If it has been determined that root formation will offer resistance to elevation, the next step will be either to divide the tooth in the long axis between the roots and elevate each half individually or, if this appears to be unsuccessful, to remove the entire crown and divide the two remaining roots. Each root can then be elevated separately. Another illustration is the horizontal type of impaction. It can be easily seen that, in this class of impaction, any type of root formation will offer resistance to removal of the tooth in a vertical direction, so that it is absolutely necessary to remove the crown completely; that is, after releasing the height of greatest convexity of the crown. After elimination of the crown, there is usually enough room present to allow elevation of the roots into the

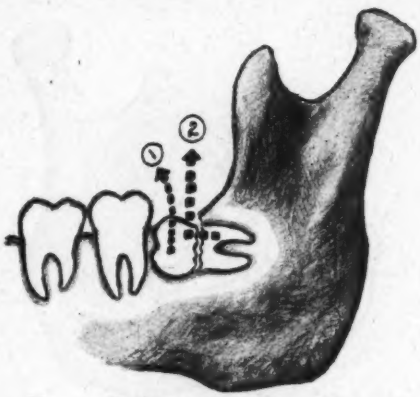


Fig. 5.—Horizontal impaction with crown resected. Arrow 1 points in the direction of removal of the crown; arrow 2, in the direction of removal of the roots, first into space left by removal of the crown, then upward out of the socket.

area previously occupied by the crown. If there is resistance to removal of both roots together, it is necessary to divide them and remove them separately.

In the following, there will be described methods of removing teeth under specific subgroups of II and III.

Horizontal

As has already been stated, in the horizontal impaction, it has been found necessary to remove the crown completely in each case. Then, in every case, regardless of root formation, which pre-

sumably will offer resistance, the attempt is made to elevate the roots. This is done by first burring a small groove between the buccal plate and the bifurcation of the roots large enough to accommodate the pic type of elevator. The elevator having been inserted in the bifurcation through the groove, and with the buccal plate of bone as the fulcrum, pressure is applied in the direction of the long axis of the roots into the space left by the removal of the crown. The attempt to elevate the tooth, even with the knowledge that abnormal root formation will produce too much resistance, is made because, in many cases, the bone between the roots in this area is surprisingly spongy and weak, so that root resistance is greater than bone resistance and the septum comes out with the roots on elevation. In horizontal impactions, when the second molar is not present, the same procedure is used; that is, removal of the crown and elevation of the roots in the long axis. When burs are used in this type of work, the 560 cross-cut fissure bur is the one of choice because, although it is not so wide as the average bone bur, it is strong enough to resist breakage and, being sharper than bone burs, does the work quickly and with a minimum amount of friction on bone. The bur can be used in either the straight or the angle handpiece, the choice depending on the angulation of the bur desired. Too much emphasis cannot be placed on the importance of judicious handling of burs in this area. Because of the proximity of the mandibular and lingual nerves, much harm can be done by the use of burs in the hands of an inexperienced operator.

Vertical

In the vertical impaction, there are only two points to be considered: the amount of bone present and the root formation. Since about 80 per cent of these are complete bony impactions, it is here that the most bone is removed, but, as in all other cases, only enough bone to free the crown is eliminated. Angulation is not considered here since only seldom is the tooth trapped by the second molar. Root formation is of prime importance in this class and, in the following, a description of the procedure necessary to remove each type of root formation will be given.

1. *Roots Fused.*—With the 560 bur, a groove is made in the bone just mesially from the impacted tooth. Actually, the groove is made in the septum between the second and third molars. The groove must be extended down to the neck of the impacted tooth and, in extending it, care must be taken not to damage the root surface of the second molar. A spearpoint elevator is placed in the groove and pressure is exerted on the impacted tooth in an upward direction. It should be easy to elevate it.

2. *Roots Straight.*—The procedure here is essentially the same as in fused roots, with the additional choice of making a groove between the buccal surface of the crown and the buccal plate down into the bifurcation. With the roots straight and, of course, all resistance to removal having been eliminated, removal with the pic type of elevator is facilitated. It is placed in the groove and, on upward pressure with the buccal plate as a fulcrum, the tooth is easily displaced.

3. *Both Roots Distal.*—In this group, the technic is the same as in fused roots. Since the pressure exerted follows the direction of the long axis of the tooth and the arc formed by the curvature of the roots, there is little chance for root fracture.

4. *Mesial Root Distal - Distal Root Straight.*—In this case, both grooves previously mentioned must be made; that is, (1) the mesial groove in the septum between the second and third molars and (2) the groove into the bifurcation of the roots. Then, with the spearpoint type

of elevator in the mesial groove, the tooth is elevated just far enough to control the curvature of the mesial root; in other words, to lift the tooth so that the curved portion of the root will slip out of the curved portion of the socket of the mesial root. Then, using the groove into the bifurcation and the buccal plate as the fulcrum, vertical pressure by a pic elevator will lift the tooth out. Care must be taken not to lift the tooth too much on the first step, since this will result in fracture of one of the root apices.

5. *Mesial Root Straight - Distal Root Distal.*—The procedure here is exactly the same as in the foregoing paragraph. Control of the distal root is necessary for successful removal.

6. *Mesial Root Distal-Distal Root Mesial.*—It can easily be determined here that elevation of any type looking to the removal of the tooth *en masse* will meet with defeat since the curvatures of both roots are contradirected, thus making elevation in any one or two directions impossible. Here, it is necessary to separate the tooth into two parts. This is done vertically in the long axis of the tooth between the roots, so that when this has been accomplished, simple groove elevation on the mesial aspect will eliminate the mesial root and the use of an east-west type of elevation will remove the distal root.

7. *Both Roots Distal.*—This is similar to the technic described in the preceding paragraph, with the addition of one step. After the tooth has been split vertically, a spearpoint elevator placed between the two segments with pressure on the distal root in an upward direction will remove the distal root. If the attempt to remove the mesial root is made, it will be found that too much resistance is met since the arc made by the root curvature runs into the second molar. Thus, it will be found necessary to remove the portion of crown still present and elevate the remaining root portion. When the septum between the roots is quite thin, it will be found possible to remove the mesial root by forcing it into the socket of the vacated distal root by mesial elevation.

8. *Miscellaneous.*—In this group have been included all root formations that are extremely abnormal and do not fall into one of the previous seven groups. Examples are: extreme 90 degree curvature of either root and the presence of three or more roots. Each type requires a different procedure. Essentially, they are alike, in that the crown must first be removed completely, and then each root, no matter how many are present, be removed separately. The order of removal will depend on the individual curvature and the number of roots present.

Angular: In this class of impaction, the prime classification is the removal of part or all of the crown so that withdrawal of the remaining roots will be facilitated. It must be understood that, as in all other impactions, bone removal down to the height of greatest convexity of the crown must first be performed.

Mesio-angular: This type of impaction has already been used as an illustration. After elimination of the necessary amount of bone and removal of enough of the crown so that the second molar is cleared on removal, further steps will be determined by the root formation. Thus, if both roots are curved distally, the procedure is the same as though the impaction were vertical; that is, mesial elevation is used. The mesial groove is unnecessary since there is enough space between the crown and the septum to accommodate the spearpoint type of elevator. In other root formations, procedures already described for specific combinations will be used.

Disto-angular: As in the horizontal type, there is no instance here wherein removal can be performed without complete segmentation of the crown of the impacted tooth. The plane of the long

axis of the tooth runs into the ascending ramus of the mandible, and thus simple mesial elevation cannot possibly be performed; nor can relief of large areas of bone facilitate the removal of the tooth. When the crown is completely eliminated, the removal of the remaining roots depends on the procedure specifically necessary for the combination of root curvature present.

Linguo-angular, bucco-angular: The problem in these two cases is similar. It can easily be understood that mesial or vertical elevation is out of the question since the long axis in either case is neither vertical nor distal. When x-ray examination, and, in these cases, it calls for adequate occlusal films, shows straight root formation, a groove wide enough to accommodate a pic elevator is burred between the roots and into the bifurcation. Pressure applied in the direction of the occlusal surface of the crown will then remove the tooth. Of course, in bucco-angular impactions, the pressure is applied buccally, and in linguo-angular impactions, lingually. When root curvature is other than straight, the problem becomes one of segmentation of the crown, with succeeding removal of the roots.

Miscellaneous: In impactions that cannot be included in previously listed groups, the problem should be attacked in a systematic fashion, with adequate x-ray films. Basically, although varying in many ways, these teeth can all be removed by cutting away the bone, with crown and root segmentation.

Conclusion

While specific rules have been laid down for removal of specific types of impacted mandibular third molars, it should be emphasized that whereas these procedures have been in constant use for a number of years with a large degree of success, these technics can be altered to some degree to suit the individual operator as well as the patient. It is felt that, essentially, the fundamentals laid down are a good basis for impaction technics. They eliminate the extreme pressure and postoperative pain from too much bone malleting in technics featuring the so-called "magic" removal of the complete tooth. Surgeons have always feared breaking down of the tooth structure.

This cannot be considered logical, since combination technics of bone removal and tooth segmentation are much easier on both the dentist and the patient. In conclusion, it is felt that the technic for successful removal of impacted mandibular third molars should be based upon adequate x-ray evidence, thorough planning and the consideration of: (1) removal of bone to the height of convexity of the crown; (2) angulation of the tooth, with consequent segmentation, and (3) curvature of the roots with consequent segmentation and division.

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HEMORRHAGE AS A SEQUEL TO REMOVAL OF MANDIBULAR THIRD MOLAR TEETH

By Harry L. Levin, D.D.S., Camp Parks, Shoemaker, Calif.*

The picture presented during hemorrhage from the socket of an extracted third mandibular molar tooth is essentially the same as that seen in extraction of any other tooth, but, owing to the density of the cortical bone and the trauma of removal of impacted teeth, hemorrhage may be excessive and threatening. Approximately a dozen cases are on record[1] wherein the inferior dental artery and vein passed through the roots of molar teeth. As the oral cavity is highly vascular, recovery from surgical operations and injury is fully expedited by the defensive mechanisms of the blood stream. On the other hand, frequent hemorrhage in one of its many forms can be expected, since the trauma inflicted has interfered with recovery or an organic disturbance has manifested itself before or after operation.

The dentist is not infrequently the first to detect manifestations of a blood dyscrasia, and he should not attempt any surgical operation, no matter how simple, until coagulation tests (clotting and bleeding time) have been made. A simple method is as follows: Blood from the ear or tip of the finger, which has been cleansed with alcohol before pricking, is put on a clean glass slide. The blood should flow from the part without squeezing, as squeezing lessens the clotting time, owing to admixture of blood with tissue fluid. The point of a clean needle is drawn through one or another of the drops at one-minute intervals until there is a distinct fibrin which will adhere to the needle a little before the true clot is formed. A complete blood count and differential leukocyte count as well as a general check-up of the health of the patient will help materially in safeguarding the surgeon's interests and the patient's as well. In recognizable general debility, it is best to wait until the bleeding and the clotting time are comparable to those in the case of normal coagulation. The normal clotting time for blood is from three to five minutes. Experience has shown that patients having a low rate of coagulation have suffered serious consequences, which have indelibly impressed on the surgeon the need for various available methods for the control of hemorrhage. The first sign of leukemia may well be an intractable hemorrhage from the socket of a recently extracted tooth. Certainly the smooth red and tender tongue of pernicious anemia (Hunter's glossitis), the necrotic gum tissue of agranulocytic angina, the hemorrhagic hypertrophied gum tissue of scurvy, the insidious steady bleeding of purpura hemorrhagica, etc., should arouse the feeling that all is not well and that the lesions are not purely local.[2]

According to Bradbury,[3] one-tenth of all patients receiving injections of bismuth develop a severe ulceration, most often about the mandibular third molar tooth rather than in other parts of the oral cavity, although the greater part

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1. Prinz, Hermann: Dental Formulary. Ed. 4. Philadelphia: Lea & Febiger, 1930.

2. Henny, F. A.: Significance of Blood Dyscrasia in Oral Surgery. J. Oral Surg., 2:106, April 1944.

3. Bradbury, Samuel, in Cecil, R. L.: Textbook of Medicine. Ed. 5. Philadelphia: W. B. Saunders Co., 1942.

of the ulceration may extend along the free margin of the gingiva and the floor of dirty mouths.

Diseases of the blood and blood-forming organs, particularly those associated with the enlarged spleen, liver and lymph nodes, or a hypoplasia or aplasia of the bone marrow, may cause mouth lesions and excessive hemorrhage after surgical procedures unless detected and eliminated.

Much has been written about hemophilia, a strange affliction following in the mendelian ratio and in which the male offspring inherits the tendency to bleed spontaneously or profusely after injury, a condition defying most efforts toward its control. The ancient Hebrews in the Talmud wrote of this disease, as it has a definite bearing upon the religious ritual of circumcision, in which the hemophilic invariably bled to death.

Fig. 1.—Elementary pressure points in hemorrhage involving third mandibular molars.

Fig. 2.—Pressure on external carotid artery to control hemorrhage emanating from sockets of extracted third mandibular molars.

TREATMENT

Dental surgeons who find it necessary to remove deeply involved third molars would do well not to treat too lightly hemorrhages arising from this area. Coaptation of the margins of molar teeth is difficult and suturing at best can serve only to retain the packing in the socket. Ligature of an artery or vein is also difficult. "Ligating the external carotid artery on one side and temporarily compressing the common carotid of the other will give a bloodless operation."[4] It is doubtful whether this is ever good procedure, for there is always the possibility of brain degeneration when such radical methods are resorted to in order to check hemorrhage before or after operation. Heroic gestures, such as using the surgeon's own blood, which is allowed to clot in the socket, have been made. The use of fresh beef as a compress has also been known to aid. After the clot has been washed away with warm water, holding a sterile piece of gauze liberally covered with tannic acid in position, with digital pressure, over the affected area for five or ten minutes will frequently suffice to control hemorrhage. Roots and

4. Blair, V. P., and Ivy, R. H.: Essentials of Oral Surgery, St. Louis: C. V. Mosby, 1926.

sharp edges of bone must be removed and sharp edges must be smoothed. Capillary oozing, though annoying and persistent, can be dealt with similarly, but there are occasions when hemorrhage cannot be controlled so simply. It then becomes necessary to determine the cause and particularly whether the patient is suffering with a blood dyscrasia such as purpura hemorrhagica, agranulocytosis, leukemia, mononucleosis and anemia.

Liver and biliary deficiencies can be treated with vitamin K injections. Sullivan[5] describes the present status of vitamin K therapy, showing the various methods by which the prothrombin level can be affected and incidentally avoided by the application of this vitamin.

Thromboplastin is frequently used. Administration of ceanothyn in 1-ounce doses is considered to have beneficial results. Topical and hypodermic administration of epinephrine in 1:1,000 strength, in 10 to 20 minims dosage, is effective. Good results have been secured from liver extract therapy. Cold applications constrict blood vessels. Calcium lactate or gluconate together with vitamin K is very effective. Sockets are usually packed with a 5 per cent iodoform gauze strip for forty-eight hours. Rest and quiet are essential. No alcoholic beverages should be allowed and a diet with a high caloric content, consisting of spinach, meat, liver, eggs, stewed fruits, foods containing vitamin C and sufficient proteins, is indicated, together with abundant fresh air and sunlight. Administration of iron, as well as other factors in production of hemoglobin and red blood cells, may accelerate the bone marrow function. Heretofore, caustics, such as ferric chloride, were frequently used to check hemorrhage, but most surgeons are agreed that this practice is outmoded. Severe interpapillary hemorrhage is checked by packing gauze liberally covered with tannic acid into the interstices of the teeth. Complete hemostasis has been obtained in hemophiliacs by the local application of a sterile 1:10,000 solution

Fig. 3.—Control of hemorrhage arising from external surfaces at or near angle of mandible.

Fig. 4.—Control of hemorrhage arising from external surfaces at or near angle of mandible.

5. Sullivan, C. J.: Statistical Analysis of Leucopenic Index. J. Allergy, 8:491, July 1937.

of Russell's viper venom.[6] It may be necessary to reapply the venom frequently within the course of the first twenty-four hours following extraction.

Calcium-chloride-urea, an organic compound in a 10 per cent aqueous solution given intravenously, has found favor with many oral surgeons. The contents of one ampule is the suggested dosage, to be repeated if necessary.

A knowledge of the pressure points can sometimes be employed to control hemorrhage until a lasting and more effective means can be brought into play. Pulsation, particularly of the external carotid artery anteriorly from the sternocleidomastoid muscle at the level of the hyoid bone, can easily be felt and the area compressed.[7] Pressure, slightly in front of the angle of the mandible, as well as firm pressure applied at the angle, will sometimes control hemorrhage from the facial and masseter branches of the external maxillary artery, respectively.

There is always the possibility of extravasation of blood into the surrounding soft tissues resulting in hematoma or ecchymosis due to laceration of a blood vessel or excessive soft tissue retraction and trauma. This type of hemorrhage often results in edema of the glottis, which occasionally causes sufficient respiratory embarrassment to require tracheotomy. A *Streptococcus hemolyticus* infection involving this area is liable to cause secondary hemorrhage. Hematomas that are not absorbed may break down and become cystic. Dingman[8] cites a recent case in which severe hemorrhage following extraction of a third mandibular molar tooth led eventually to the formation of an ameloblastoma with malignant tendencies.

Finally, drugs being of no avail, saline infusions may be resorted to. The use of tranfusions of whole blood is much more satisfactory and beneficial in that clotting and bleeding time may again be brought to normal or near normal.

In the event of shock, the surgeon may experience a false sense of security. Mead[9] states that though there is a temporary cessation of the blood flow while the patient is in shock, with recovery the hemorrhage probably will commence anew unless checked.

SUMMARY

1. Inquiry into previous history relative to bleeding and a complete laboratory check-up will determine the course and method of procedure to be taken in the treatment of those cases with blood dyscrasias.

2. Preparation of the area of operation, with débridement of heavily traumatized tissue, combined with suturing if necessary and packing with sterile gauze saturated with a hemostatic until reorganization can take place, frequently suffices to prevent hemorrhage.

3. The patient must not be dismissed from the office until all bleeding has ceased. He is instructed to bite gently, but firmly upon a sterile gauze pad for a period of five minutes.

4. The patient should be instructed as to the postoperative care, such as the application of an ice pack externally; the importance of not rinsing the mouth for twenty-four hours; proper rest; a diet of high caloric content; abstinence from alcoholic drinks, and avoidance of excitement and exertion. The administration of barbiturates helps materially to lower blood pressure.

5. Preliminary medication with vitamin K and calcium for several days before the operation may be indicated.

6. Comroe, I. B.; Collins, L. H., Jr, and Crane, M. P.: Internal Medicine in Dental Practice. Philadelphia: Lea & Febiger, 1938, p. 719.

7. Stout, R. A.: Mil. Surgeon, 87:247, September 1940.

8. Dingman, R. O.: Ameloblastoma of Mandible: Report of Case. J. Oral Surg., 2:175, April 1944.

9. Mead, S. V.: Am. J. Orthodontics, 26: 982, October 1940.

CONCLUSION

In order to keep this potentially dangerous complication, hemorrhage, at a minimum, the surgeon should assure himself that all precautions to prevent it have been taken. He should check up on the postoperative condition of the patient.

Blood clots should be clean and there should be no suspicious odors. Many sleepless nights for both the patient and surgeon can readily be averted by adhering to that old adage, "An ounce of prevention is worth a pound of cure."

Recent work of Davidson and MacDonald,[10] Howell[11] and Allen and Barker,[12] to name a few of the many investigators, attest to the importance of this subject, since much of their research has led to controversial issues over medicaments, and the best methods to combat and check this condition of hemorrhage continue to occupy the pages of current literature.

The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Construction Battalion Replacement Depot.

FACTORS IN DENTAL BACTEREMIA*

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Ever since the relationship of tooth or gum infection to subacute bacterial endocarditis has been realized, a variety of suggestions have been made as to the means of preventing the bacteremia following extraction of teeth and the subsequent valve infection.

Thayer,[1] in 1926, called attention to the importance of eliminating dental foci of infection.

Abrahamson[2] stated, in 1931, that only one or two teeth should be removed at a time and that teeth requiring a great deal of manipulation should be left untouched. He favored general anesthesia and believed that local anesthesia should not be used. He also suggested the preliminary use of autogenous vaccines and cautioned against the employment of crowns and the preservation of pulpless teeth.

Brown,[3] a year later, advised general anesthesia. He believed that one tooth should be extracted and cultured to test

10. Davidson, C. S., and MacDonald, Harriet: New England J. Med., 229:353, August 26, 1943.

11. Howell, W. H.: Recent Advances in Problem of Blood Coagulation Applicable to Medicine. J.A.M.A., 117:1059, September 27, 1941.

12. Allen, E. V., and Barker, N. W.: Vascular Clinics: Conjecture Concerning Benefits to Man of Artificially Impaired Coagulation of Blood. Proc. Staff Meet., Mayo Clin., 18:107, April 7, 1943.

*From the wards and dental clinic of the Jewish Hospital. Work aided by a grant from the Jewish Hospital Research Fund.

*This paper is based on a thesis submitted by Dr. Pressman to the faculty of the Graduate School of Medicine of the University of Pennsylvania, toward the requirements for the degree of master of medical science for graduate work in internal medicine.

1. Thayer, W. S.: Studies on Bacterial (Infective) Endocarditis. Johns Hopkins Hosp. Rep., 22:1-185, 1926.

2. Abrahamson, L.: Subacute Bacterial Endocarditis Following Removal of Septic Foci. Brit. M. J., 2:8, July 4, 1931.

3. Brown, H. H.: Tooth Extraction and Chronic Infective Endocarditis, Brit. M. J., 1:796, April 30, 1932.

the bactericidal power of the blood against the offending organism. If this were deficient, graduated doses of vaccine were suggested.

Feldman and Trace,[4] in 1938, recommended improving the patient's general condition, but then suggested cleaning and scraping the teeth to prevent contamination of the operative field, extraction of but one or two teeth a week and, finally, curetment and treatment of the socket with antiseptics.

Elliott,[5] in 1939, pointed out the need for scrupulous attention to oral hygiene in patients with preexisting cardiac abnormalities and the absolute necessity to avoid massive extraction and "rocking." He also tentatively suggested cauterizing the gum margins as a prophylactic measure. In discussing Elliott's work, E. W. Fish advised against brushing the teeth or chewing hard food, and suggested that the interdental spaces be gently packed with a paste of zinc oxide and oil of cloves in cotton, to be changed every few days. When a tooth is to be extracted, he recommends a "dose of prontosil" (azosulfamide) preceding operation, prior to which the gum margins should be thoroughly cauterized.

Long and Bliss,[6] in their book published in 1939, advised giving sulfanilamide prophylactically to all patients with rheumatic heart disease who must undergo dental extractions.

Bartels,[7] in 1940, viewed both gum cautery and sulfanilamide as unproven, but did emphasize the importance of isolating the patient with heart involvement, the dentist to work hand-in-hand with the physician. He also urged preventive dentistry, the "number of teeth demanding extraction to be reduced to a minimum."

Kolmer,[8] in reviewing the progress of chemotherapy in 1940, recommended a course of sulfanilamide in the pattern suggested by Long and Bliss,[6] but seemed to doubt its effectiveness.

Kolmer and Tuft,[9] in 1941, suggested a more rigid régime. They stressed the need to avoid "wholesale" extraction of teeth, no more than one or two teeth to be removed at a time. They advised use of an autogenous streptococcus vaccine made from the apical culture of the first tooth removed, the vaccine to be administered before any other teeth are removed. They advised giving sulfapyridine, 15 grains, every six hours day and night, two days before extraction and two to three days after. They also recommend the Thomas[10] routine, sulfanilamide, grains 10, twice a day from November to June, in persons recovering from acute rheumatic fever.

Pacquin,[11] in 1941, suggested premedication with the sulfonamides, sulfapyridine or sulfathiazole prior to extraction or radical pyorrhea treatment.

Spink,[12] in 1941, urged that sulfanilamide be given from twelve to eighteen hours before operation in order to obtain a blood level of 7 mg. per hundred cubic centimeters at the time of extraction.

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4. Feldman, L., and Trace, I. M.: Subacute Bacterial Endocarditis Following Removal of Teeth or Tonsils. Ann. Int. Med., 11:2124, June 1938.

5. Elliott, S. D.: Bacteremia and Oral Sepsis. Proc. Roy. Soc. Med., 32:747, May 1939.

6. Long, P. H., and Bliss., E. A.: Clinical Use of Sulfanilamide, Sulfapyridine and Allied Compounds. New York: Macmillan Co., 1939.

7. Bartels, H. A.: Review of Recent Literature Dealing with Transient Bacteremias. Am. J. Orthodontics, 26:366, April 1940.

8. Kolmer, J. A.: Progress in Chemotherapy of Bacterial and Other Diseases. Arch. Int. Med., 65:671, April 1940.

9. Kolmer, J. A., and Tuft, L.: Clinical Immunology, Biotherapy and Chemotherapy. Philadelphia: W. B. Saunders Co., 1941.

10. Thomas, C. B.; France, R., and Reichsman, F.: Prophylactic Use of Sulfanilamide. J.A.M.A., 116:551, February 15, 1941.

11. Paquin, O., Jr.: Bacteremia Following Removal of Diseased Teeth. J.A.D.A., 28:879, June 1941.

12. Spink, W. W.: Sulfanilamide and Related Compounds in General Practice. Chicago: Year Book Publishers, 1941.

Budnitz, Nizel and Berg,[13] in 1942, gave sulfapyridine, 1.0 gm. initially, then 0.5 gm. every four hours for a period of six or seven days, extraction being carried out on the third or fourth day.

Geiger,[14] in 1942, condemned indiscriminate extraction, suggesting that the dentist ascertain whether the patient is free from heart disease before extraction. He recommended giving sulfadiazine before and after extraction.

Northrop and Crowley,[15] in 1943, did not think it necessary to administer sulfathiazole before and after extraction for a considerable period of time. They believe that it is essential to get a blood sulfathiazole level above 3.0 mg. per hundred cubic centimeters at the time of extraction.

In a previous study,[16] we reported the effect of sulfanilamide on transient bacteremia following extraction of teeth. This report deals with the effect of cauterization on the periodontal tissues in the prevention of bacteremia and other conditions that were observed in the first study. In order to present some of the factors in dental bacteremia, we find it necessary to repeat some of the observations in the previous study.

PROCEDURES

Ten cubic centimeters of blood was drawn from the median basilic vein in the antecubital space of either arm, through a 22-gage needle into a sterile 20-cc. syringe. The blood was distributed as follows: 8 cc. was divided equally between two 100-cc. Erlenmeyer flasks, each containing 20 cc. of medium (brain-heart infusion broth) fortified with 0.033 per cent sodium polyanetholsulfonate.[17] At first, duplicate cultures were taken on all aerobic specimens, but, later in the course of study, difficulty was experienced in obtaining the sodium polyanetholsulfonate from Switzerland. As a result, only one sample was taken for the pre-extraction and the ten-minute postextraction culture, instead of running them in duplicate.

Two cubic centimeters was placed in 25-cc. test tubes containing 10 cc. of media (for anaerobic jar). In patients receiving sulfanilamide, an additional 5 cc. was taken and citrated. From this sample, the sulfanilamide level was determined.[18] The blood was withdrawn at the following intervals: immediately before extraction, immediately after extraction and ten minutes after extraction. The cultures were incubated at 37 C. and examined at twenty-four-hour intervals for seven days. Only cultures that became cloudy, showed color change, developed an odor or otherwise appeared to show growth were opened. All were opened and smeared at the end of seven days. All suspicious specimens were subcultured before being discarded.

Anaerobic technics followed the Brewer-Brown method.[19]

13. Budnitz, E.; Nizel, A. E., and Berg, L.: Prophylactic Use of Sulfapyridine in Patients Susceptible to Subacute Bacterial Endocarditis Following Dental Surgical Procedures. Preliminary Report. J.A.D.A., 29:346, March 1942.

14. Geiger, A. J.: Relation of Fatal Subacute Bacterial Endocarditis to Tooth Extraction. J.A.D.A., 29:1023, June 1942.

15. Northrop, P. M., and Crowley, M. C.: Prophylactic Use of Sulfathiazole in Transient Bacteremia Following Extraction of Teeth. Preliminary Report. J. Oral Surg., 1:19, January 1943.

16. Pressman, R. S., and Bender, I. B.: The Effect of Sulfanilamide on Transient Bacteremias Following Extraction of Teeth. I. Sulfanilamide. Arch. Int. Med., 74:346, November 1944.

17. Massa, M., and Battistini, G.: Anticomplementary Action and Inhibition of Bactericidal Power of Blood by Sodium Polyanethosulfonate Used in Hemoculture. Zentrabl. f. Bakt. (Abt. 1), 131:241, April 5, 1934.

18. Bratton, A. C., and Marshall, E. K., Jr.: New Coupling Component for Sulfanilamide Determination. J. Biol. Chem., 128:537, May 1939.

19. Brewer, J. H., and Brown, J. H.: Method for Utilizing Illuminating Gas in Brown, Fildes and McIntosh or Other Anaerobe Jars of Laidlaw Principle. J. Lab. & Clin. Med., 23:870, May 1938.

MATERIAL

Clinical material was taken from the dental outpatient clinic and wards of the Jewish Hospital. A total of seventy-three patients were examined. Patients were taken at random, the only requirement being that two or more teeth were to be extracted. The first patients were divided into two groups that were studied concurrently. Three were rejected, leaving a group of thirty controls and another group of thirty patients that received sulfanilamide. The first ten patients were all controls, but thereafter selections were made so that the two groups were only approximately equal. The remaining ten patients (Group III) were studied to see what effect cauterization of free gum margin had on bacteremia. The extraction was carried out in the morning, usually on not more than three patients at a time.

The age ranged from 19 to 70, the majority of the patients being above 40 years. There were twenty-five women and thirty-five men in the first two groups, and seven women and three men in the third group.

The gum condition was graded on a basis of the severity of the disease: periodontoclasia, Class I, II or III.[20] In Class I, disease was not apparent. Class II included all cases with evidence of mild to moderate gum disease. Class III comprised cases of severe gum disease.

Extractions ranged from two to ten teeth. There was an average of approximately four teeth removed in the control group (I) and approximately 4.8 teeth were extracted in the sulfanilamide group (II). In the cauterization group (III), only two isolated teeth were extracted at a time in order to cauterize the free gum margin carefully and completely for the circumference and depth of the periodontal pocket. In none of these teeth was there pulpal involvement and the periapical region was roentgenographically negative. In all instances, these were single-rooted teeth. The usual method of extraction was employed, using the elevator and forceps technic.

In all cases, approximately 2.5 cc. of procaine without epinephrine was injected. Anesthesia was either conduction or infiltration, the choice depending on the location of the teeth. Procaine without epinephrine was used to avoid interference with the dispersal of organisms from the gingival trough.[21]

All patients were given the same dosage, a total of 110 grains (7.35 gm.)

TABLE 1.—INCIDENCE OF BACTEREMIA

Number of Cases	Group	Pre-extraction	Immediately After Extraction	Ten Minutes After Extraction
		Aerobic Cultures		
30	Controls (I)	1 (3.3%)	25 (83.3%)	10 (33.3%)
30	Sulfanilamide (II)	0 (0.0%)	23 (76.6%)	4 (13.3%)
10	Cauterization (III)	0 (0.0%)	2 (20.0%)	(0.0%)
		Anaerobic Cultures		
27	Controls (I)	0 (0.0%)	17 (62.9%)	3 (11.1%)
30	Sulfanilamide (II)	0 (0.0%)	12 (40.0%)	1 (3.3%)

20. Tr. Eight Internat. Dental Congress: Sec. IV, Paris, 1931.

21. Burket, L. W., and Burn, C. G.: Bacteremias Following Dental Extraction. Demonstration of Source of Bacteria by Means of a Non-Pathogen (Serratia Marcescens). J. D. Res., 16:521, December 1937.

in the twenty-four hours preceding extraction. This was given as follows: 20 grains (1.35 gm.) four times daily the day before extraction and 30 grains (2.0 gm.) four hours before extraction.

Despite the fact that, in all cases, dosage was the same, the sulfanilamide blood level varied from 5.0 to 11.0 mg. per hundred cubic centimeters. The average level for the thirty patients receiving sulfanilamide was 7.5 mg. per 100 cc. Three cases with a blood level below 5.0 mg. per hundred cubic centimeters were discarded because it was felt that a maximum effect could be obtained only with a blood sulfanilamide level of about 5.0 mg. per hundred cubic centimeters. Spink[12] recommends a slightly higher figure, 7.0 mg. per hundred cubic centimeters; and although it is feasible to obtain that level as an average, it was found that ambulatory patients could not tolerate any higher dosage.

RESULTS

In cultures taken prior to extraction, there was one positive culture in the control group. *Staphylococcus albus* was the organism recovered. In the sulfanilamide group, all cultures taken before extraction were negative. (Table 1.)

In the control cultures taken immediately after extraction, 83.3 per cent, or twenty-five out of thirty, were positive. The organisms isolated are listed in Table 2. In the sulfanilamide group, immediately after extraction, 76.7 per cent, or twenty-three out of thirty, were positive.

In the control series, of the thirty cultures taken ten minutes after extraction 33.3 per cent, or ten cases out of thirty, were positive. In the sulfanilamide group, 13.3 per cent, or four out of thirty cases, were positive.

In the anaerobic control cultures, immediately following extraction, 62.9 per

TABLE 2.—ORGANISMS RECOVERED

	Preextraction		Immediately After Extraction		Ten Minutes After Extraction		Total
Control Group (I)	Aerobic	Anaerobic	Aerobic	Anaerobic	Aerobic	Anaerobic	
Streptococcus viridans	0	0	21	15	9	2	47
Staphylococcus albus	1	0	4	1	2	1	9
Pneumococcus	0	0	3	1	0	0	4
Nonhemolytic streptococcus	0	0	1	2	0	0	3
Total	1	0	29	19	11	3	63
Sulfanilamide Group (II)							
Streptococcus viridans	0	9	20	11	2	1	34
Staphylococcus albus	0	0	1	0	1	0	2
Pneumococcus	0	0	2	0	1	0	3
Streptococcus hemolyticus	0	0	0	1	0	0	1
Nonhemolytic streptococcus	0	0	1	0	0	0	1
Total	0	0	24	12	4	1	41
Cauterization Group (III)							
Streptococcus viridans	0	0	1	0	0	0	1
Pneumococcus	0	0	1	0	0	0	1
Total	0	0	2	0	0	0	2

cent, or seventeen out of twenty-seven, showed growth. In the anaerobic sulfanilamide group, 40 per cent, or twelve out of thirty, were positive.

In the ten-minutes series, the anaerobic control cultures were 11.1 per cent, or three out of twenty-seven, positive.

In the ten-minute sulfanilamide anaerobic group, there was only 3.3 per cent, or one positive culture.

In the cauterization series, only two cultures were positive, and both appeared in the group immediately after extraction.

TABLE 3.—TOTAL OF ORGANISMS RECOVERED

Streptococcus viridans	82
Staphylococcus albus	11
Pneumococcus	8
Streptococcus hemolyticus	1
Nonhemolytic streptococcus	4

COMMENT

In a series of thirty blood cultures taken immediately after the extraction of from two to ten teeth, 83.3 per cent were positive in the control series. In a corresponding number receiving sulfanilamide and possessing a blood level of at least 5 mg. per hundred cubic centimeters of blood at the time of extraction, 76.7 per cent were positive. There is no significant difference between these two percentages, which indicates that sulfanilamide has no immediate effect upon the bacteremia following extraction of teeth. In the ten-minute interval blood cultures, there is some evidence of delayed effect. The control series were 33.3 per cent positive, while the sulfanilamide group was 13.3 per cent positive. The difference in percentage is significant[22] in that it illustrates a reduction in "bacteremia time."

In a small but selected number of cases in which the gum tissue was cauterized, positive cultures were obtained.

There are various factors in the passage of organisms from the oral cavity to the blood stream, some local, both endogenous and exogenous, others systemic and mainly endogenous. We will attempt to show how each of these factors operates and interpret our results and those of others in the production of bacteremia.

1. *Anesthesia.*—All extractions were performed under local anesthesia, with 2 per cent procaine without epinephrine. It was believed that epinephrine constricted the capillaries and prevented the ready access of organisms to the blood stream, as suggested by Burket and Burn.[21] Feldman and Trace[4] also suggested use of a local anesthetic because it compressed the lymphatics and prevented dissemination. Round *et al.*,[23] Brown[3] and Abramson,[2] the protagonists of general anesthesia, hold the opposite view. We believe that the more vigorous trauma of extraction under general anesthesia produces a higher incidence of bacteremia. One of the dominant factors in the low percentage of positive cultures may be inadequate media, which will be considered later.

A further impetus to the use of procaine is the work of Vilardo.[24]

As regards the question of conduction versus infiltration anesthesia, conduction anesthesia is almost in the same category as general anesthesia since it is administered distantly from the actual field of operation. Thus, the above named investigators [2, 3, 23] refer solely to infiltration anesthesia. The results of Burket and Burn[21] lend support to the theory that infiltration anesthesia may act as a

22. Mainland, D.: Treatment of Clinical and Laboratory Data. London: Oliver & Boyd, 1938.

23. Round, H.; Kirkpatrick, H. J. R., and Hails, C. G.: Further Investigations on Bacterial Infections of Mouth. Proc. Roy Soc. Med., 29:1552, October 1936.

24. Vilardo, S.: Immunitary Phenomena in Procaine Hydrochloride Anesthesia. Gior. di batteriole immunol., 20:1201, June 1938.

barrier to the passage of organisms into the blood stream.

2. *Culture Technic.*—The problem of isolating organisms circulating in the blood stream is one of peculiar difficulty. Culture technics must be of unusual sensitivity since it soon becomes apparent that the offending bacteria are few. At first, 1 cc. of citrated blood was plated with 10 cc. of agar, but these cultures were negative, although broth cultures were positive, an indication that the organisms were fewer than one to the cubic centimeter of blood. Elliott[25] also discontinued the use of pour plates. A further substantiation is the finding in duplicate cultures of one positive and one negative. If there is only one organism per 8 cc., one flask must show no culture, as was repeatedly shown. Thus, unless the bacteria are given every chance to grow by the most sensitive methods of blood culture, negative results will be obtained. We believe that the low percentage of positive cultures obtained by many American investigators is due to a lack of sensitive media in a majority of cases and not to the type of anesthesia used.

In 1932, Reith and Squier[26] procured bacterial growth in 27 per cent of 194 patients with chronic focal infection. Massa and Battistini,[17] Okell and Elliott,[27] Baiocchi,[29] Von Haebler and Miles,[30] Hoare[31] and Sgalitzer[30] reported their findings.

We finally decided to use a heart-brain broth, fortified with 0.033 per cent sodium polyanetholsulfonate. This combination was effective and conserved our supply of sodium polyanetholsulfonate.

The results obtained under anaerobic conditions were disappointing. This may be ascribed to the fact that only 2 cc. of blood was cultured anaerobically, while 8 cc. was cultured aerobically. Thus, under conditions in which organisms are so few, definitely being less than one per cubic centimeter, inevitably there must be a lesser number of positive cultures. On no occasion, in our series, was a growth obtained under anaerobic conditions when the organisms had failed to grow aerobically. Okell and Elliott[27] had almost as high a degree of positive cultures under anaerobic conditions as with aerobic media. (Spink,[12] Hoarse,[31] Swaim[32] and Solowey.[33])

Recently, it has been demonstrated that para-aminobenzoic acid exerts a powerful inhibitory effect on sulfanilamide.[34] The most surprising finding was that there was no substantial difference in the results between those cultures containing sulfanilamide and those of the controls in the aerobic group. Moreover,

25. Elliott, S. D.: Bacteremia and Oral Sepsis. Proc. Roy. Soc. Med., 32:749, May 1939.

26. Reith, A. F., and Squier, T. L.: Blood Cultures of Apparently Healthy Persons. J. Infect. Dis., 51:336, September-October 1932.

27. O'Kell, C. C., and Elliott, S. D.: Bacteremia and Oral Sepsis. Lancet, 2:869, October 19, 1935.

28. Elliott, S. D.: Use of Saponin in Blood Culture Media with Special Reference to Blood Cultures in Subacute Bacterial Endocarditis. J. Path. & Bact., 46:121, January 1938.

29. Baiocchi, P.: Contributo allo Studio Delle Batteriemie Chirurgiche con Emoculture Comparate; Batteriemia Pre-E Post-Operatoria Negli Interventi Asettici. Gior. di. batteriol. e immunol., 21:63, July 1938.

30. Von Haebler, T., and Miles, A. A.: Action of Sodium Polyanetholsulphonate ("Liquoid") on Blood Cultures. J. Path. & Bact., 46:245, March 1938.

31. Hoare, E. D.: Suitability of "Liquiod" for Use in Blood Culture Media, with Particular Reference to Anerobic Streptococci. J. Path. & Bact., 48:573, May 1939.

32. Swain, R. H. A.: Strain Variations in Resistance of Streptococcus Viridans to Sulphonamide Compounds. Brit. M. J., 1:722, May 4, 1940.

33. Solowey, M.: Serological Classification of Viridans Streptococci with Special Reference to Those Isolated from Subacute Bacterial Endocarditis. J. Exper. Med., 76:109, July 1942.

34. Woods, D. D.: Relation of Para-Aminobenzoic Acid to Mechanism of Action of Sulfanilamide. Brit. J. Exper. Path., 21:74, April 1940.

it was determined that the sulfanilamide was stable, being present in the same concentration in the flask at the end of seven days.

Recently, De Waal, Kanaar and McNaughton[35] pointed out the similarity that exists between procaine and paraaminobenzoic acid. The possibility that the presence of procaine might have an inhibitory effect on the action of the sulmonamides was investigated, with mice as the experimental animal. Procaine was shown to have an antisulfanilamide action, but it was felt that, with a blood level of 3 mg. per hundred cubic centimeters of sulfanilamide, 10 cc. of a 3 per cent solution would prove harmless. Since we used but 2.55 cc. of a 2 per cent solution of procaine, this factor should not be considered a factor in our sulfanilamide series.

Moreover, occasional control cases had blood samples taken to determine whether any procaine had entered the blood stream. In all instances, the findings were negative.

3. *Type of Organism Recovered.*—In classifying the organisms obtained in cultures, it was decided to employ one of the standard methods in common usage, in special reference to the streptococci, where it was believed that a simpler classification would lead to easier correlation with the terminology found in the majority of our references. (Table 2.)

Classically, streptococci are divided into alpha, beta and gamma groups.[36] Alpha streptococci produce greening (hence, *Streptococcus viridans*) and are in the main a heterogeneous group.[32, 33] Frequently, fermentation tests were made, but they were rarely satisfactory. In all cases, in order to differentiate the streptococcus from the pneumococcus, inulase activity and bile solubility tests were performed. Solowey [33] calls attention to the fact that serologic methods have shown *Streptococcus viridans* to be a heterogeneous group of organisms. She points out that there is no serologic difference between strains of the viridans streptococci isolated from subacute bacterial endocarditis and those organisms isolated from human throats and extracted teeth.

Viridans streptococci have repeatedly been shown to be the dominant bacteria of the sputum,[37] root canal, pulp and periapical tissues.[38-42] In the same preponderance, it is the organism recovered on culture after extraction of teeth and in subacute bacterial endocarditis. (Kreidler.[43]) In some instances,[44] the streptococcus cultures from dental lesions have been agglutinated by a significant dilution of the patient's serum.

The other types of streptococci were rarely seen; the nonhemolytic variety being recovered four times and the beta or

35. De Waal, H. L.: Kanaar, A. C., and McNaughton, J.: Antisulphanilamide Action of Procaine in Vivo. Lancet, 2:724, December 19, 1942.

36. Topley, W. W. C., and Wilson, G. S.: Principle of Bacteriology and Immunology. Baltimore: William Wood and Company, 1936.

37. Hooker, S. B., and Anderson, L. M.: Heterogeneity of Streptococci Isolated from Sputum, with Critique on Serological Classifications of Streptococci. J. Immunol., 16:291, April 1929.

38. Grossman, L. I.: Present Status of the Pulpless Tooth. Ann. Int. Med., 13:1805, April 1940.

39. Palmer, H. D., and Kempf, M.: Streptococcus Viridans Bacteremia Following Extraction of Teeth: Multiple Mycotic Aneurysms in the Pulmonary Arteries. J.A.M.A., 113:1788, November 11, 1939.

40. Hopkins, J. A.: Streptococcus Viridans Bacteremia Following Extraction of Teeth. J.A.D.A., 26:2002, December 1939.

41. Faillo, P. S.: Blood Findings on Twenty Patients Before and After Extraction of Teeth. J. D. Res., 21:19, February 1942.

42. Haden, R. L.: Bacteriologic Study of Chronic Periapical Dental Infection. J. Infect. Dis., 38:486, June 1926.

43. Kreidler, W. A.: Bacteriologic Studies in Endocarditis. J. Infect. Dis., 39:186, September 1926.

44. Rushton, M. A.: Subacute Bacterial Endocarditis Following Extraction of Teeth. Guy's Hosp. Rep., 80:39, January 1930.

hemolytic streptococcus being seen only once. The two other organisms found with some degree of frequency were the pneumococcus and *Staphylococcus albus*. In all, pneumococci were recovered from the blood stream eight times. They tended to be atypical, with aberrations of the capsule, and, in every case, resisted typing with specific sera, an indication that they were avirulent, saprophytic inhabitants of the oral cavity.

The only type of staphylococcus found, the albus variety, frequently displayed hemolysis. In all, it was recovered eleven times, mainly in the control group. Although we did not use the coagulase test uniformly, we did find that of those organisms tested, all were avirulent. This was not so frequent as Murray and Moosnick's cases.[45] In our control series, we found no positive growth in the preoperative group, with one exception, substantiating the finding that the organisms were not introduced through the skin. Although it is considered by some to be a contaminant, [5, 46] Burn and Burket[47] showed a staphylococcus to be present in 48 per cent of their positive cultures, while the same organism was obtained in 42 per cent of the cultures taken from the blood stream at the same time. Thus, staphylococci cannot be considered as contaminants, but should be considered as inhabitants of the oral cavity that gain access to the circulatory system.

TABLE 4.—NUMBER OF TEETH EXTRACTED

No. of Teeth	Control Group (I) (Cases)	Sulfanilamide Group (II) (Cases)	Cauterization Group Group (III) (Cases)	Total
2	6	3	10	19
3	6	6		12
4	8	7		15
5	5	1		6
6	4	9		13
7	1	2		3
8		1		1
9				0
10		1		1

4. *Number of Teeth Extracted and Degree of Trauma Produced.*—In our series, at least two teeth were removed at one sitting, although, on one occasion, as many as ten teeth were extracted. (Table 4.) Interestingly enough, the latter case showed negative cultures throughout. Three other patients, each of whom had seven teeth removed at a time, all gave negative reactions. Twenty-five per cent of the total group had four teeth extracted at a sitting. In all, the sixty patients had an average of 4.35 teeth removed.

Although it is generally agreed that no more than one or two teeth should be removed at a sitting, [2, 3, 4, 7, 48] Elliott[5] has shown that it is not the number of teeth removed, but rather the trauma produced in the process that is the important factor. Our experimental observations substantiate Elliott's conclusion. The removal of ten teeth with a minimum of trauma does not necessarily give rise to a bacteremia. Rocking a tooth[5] or chewing a resistant mass[23, 45] may cause a greater influx of organisms into the bloodstream than with the extraction of teeth without trauma.

It will be realized that the greater the number of teeth extracted, the more extensive the resultant trauma. Removing one tooth at a time reduces trauma and

45. Murray, M., and Moosnick, F.: Incidence of Bacteremia in Patients with Dental Disease. J. Lab. & Clin. Med., 26:801, February 1941.

46. Northrop, P. M., and Crowley, M. C.: Preliminary Report on Prophylactic Use of Sulfathiazole on Transient Bacteremias Following Extraction of Teeth. New York J. Dent., 13:97, March 1943.

47. Burn, C. G., and Burket, L. W.: Comparative Bacteriologic Studies of Human Blood, Viscera and Teeth Obtained at Necropsies. Arch. Path., 25:643, May 1938.

48. Wyckoff, J.: Relationship of Heart Diseases to Dentistry as the Physician Sees It. J. New York Acad. Dent., 2:81, September 1935.

lessens the possibility of bacteremia.

5. *Mode of Entry of Organisms into the Blood Stream.*—It has been demonstrated and conclusively proved by Burket and Burn[21] that organisms get into the blood stream from the gingival trough. Fish and MacLean[49] first promulgated the concept that it was impossible to remove a tooth aseptically because bacteria are forced into the pulp and periapical tissues during the process of extraction. Gunter and Appleton[50] have shown that the pulp tissue is sterile if the pulp is cultured *in situ*. Thus, the flora of the mouth, mainly *Streptococcus viridans,* are actually forced into every portion of the tissues surrounding the tooth as the organisms circulate through the blood stream.

The mechanism of entry has been debated at length. Fish and MacLean[49] ascribe it to the pumping action of the rigid tooth in its rigid socket. Burket and Burn[21] believe it due to the "piston-like" action of the tooth during extraction.

Another consideration is the fact that, in its passage, venous blood is sucked through the veins by negative pressure in the vena cava. Patients who have large veins severed may have introduced into the circulation enough air to cause death from embolism. In the same manner, until clotting takes place in the veins of the freshly extracted tooth socket, the organisms that are carried in as the tooth is removed might be transported through the vascular channels of the body. Probably, the modus operandi is a combination of two or more of the suggested mechanisms. Elliott[5] demonstrated how the manipulation of a single tooth can produce an 86 per cent bacteremia through the operation of these conditions. Where acute apical infection existed, only 25 per cent positive cultures were obtained, suggesting that an acute inflammatory reaction "walls off" the infected focus from the general circulation. At the same time, the patient tends to form antibodies against the organisms harbored in the infected focus.[51]

It has been further shown[23, 45] that the trauma of chewing is alone sufficient to send showers of organisms into the blood stream. Since there are no open sinuses attracting these organisms, the inescapable conclusion is that with every bite, in patients with known periodontal disease, the finer blood vessels rupture, permitting the access of bacteria, whether forced in by the jarring of the tooth during the bite or being aspirated by venous suction. This is substantiated histologically[52, 53, 54] since, in cases of true traumagenic occlusion, there is hemorrhage of the periodontal membrane. The rupture of the capillaries serves as a portal of entry for the organisms. It is probably on this basis that positive cultures are obtained during the act of mastication in periodontal disease.

6. *Method of Removal of Organisms from the Bloodstream.*—In considering the myriad organisms that inhabit the mouth and the ease with which they can enter the circulation, the surprising finding is that cultures are not uniformly positive after extraction. This may be ascribed in part to the efficient clearing mechanism that exists within the body;

49. Fish, E. W., and MacLean, I.: Distribution of Oral Streptococci in the Tissues. Brit. D. J., 61:336, September 15, 1936.

50. Gunter, J. H., et al.: Bacteriology of Dental Pulp. J. D. Res., 16:310, August 1937.

51. Bender, I. B., and Tassman, G. C.: Antibacterial Action of Human Whole Blood upon Bacteria Isolated from Periapical Tissue. J.A.D.A., 28:1962, December 1941.

52. Kronfeld, Rudolf: Histopathology of Teeth and Their Surrounding Structures. Philadelphia: Lea & Febiger, 1942.

53. Coolidge, E. D.: Traumatic and Functional Injuries Occurring in the Supporting Tissues of Human Teeth. J.A.D.A., 25:343, March 1938.

54. Bodecker, C. F.: Critical Review of Gottlieb and Orban's "Die Veränderungen der Gewebe bei ueber-maessiger Beanspruchung der Zähne." Internat. J. Orthodontia, 18:895, September 1932.

also, to the mechanical difficulties of culturing discussed earlier.

The speed of the clearing mechanism is plainly shown in the control group wherein twenty-five of thirty (83.3 per cent) cultures were positive immediately after extraction. In ten minutes, only ten of thirty (33.3 per cent) were still positive. Although we did not take cultures after the ten-minute interval, it has been shown[27] that, beyond ten minutes and up to thirty minutes, only occasional cultures remain positive. All of the cultures taken by Burket and Burn[21] after ten minutes were negative. The majority of investigators find approximately the same conditions: regardless of the insult and the number of organisms poured into the blood stream, the natural defense mechanism of the body will effect their removal.

Petersen, Muller and Boikan[55] found that the bacteria were removed by the reticulo-endothelial cells (mainly the liver). Despite the overwhelming concentration of organisms, few bacteria succeeded in getting from the blood stream into the lymph stream. Canon, Neckerman and Sullivan [56] found that this fixation of bacteria could be enhanced by specific active immunization. Reichel[57] demonstrated that there is apparently no limit to the number of bacteria that can be removed, and that all types of bacteria can be removed simultaneously.

Despite the seeming inexhaustible power of the reticulo-endothelial system to remove bacteria from the circulation in short periods of time, there is evidence that either the methods of removal are far from perfect or there are so many modes of entry or "leaks" into the circulation that the body clearing mechanism is hard pressed to maintain the vascular tree free of organisms. Reith and Squier[26] found 27 per cent positive cultures where there was evidence of chronic focal infection. Lichtman and Gross[58] found an incidence of nonhemolytic streptococcemia (alpha and gamma types) of between 4.0 and 15.5 per cent in nine diseases. Okell and Elliott[27] found 10.9 per cent to have bacteremia in their preoperative control cultures. Southworth and Flake [59] found 13.6 per cent with positive cultures before extraction. In contrast, we had only one case in seventy with a positive culture prior to extraction.

TABLE 5.—RELATION OF PERIODONTOCLASIA TO INCIDENCE OF BACTEREMIA

Periodontoclasia	Number of Cases	Cases with Positive Cultures
Control Group (I)		
Class I	11	8 (73.0%)
Class II	10	10 (100.0%)
Class III	9	7 (77.7%)
Sulfanilamide Group (II)		
Class I	15	11 (73.0%)
Class II	9	7 (78.0%)
Class III	6	5 (83.0%)
Cauterization Group (III)		
Class I	1	0 (0.0%)
Class II	7	2 (28.0%)
Class III	2	0 (0.0%)

55. Petersen, W. P.; Muller, E. F., and Boikan, W.: Reaction of Dog to Continuous Intravenous Injection of B. Coli, Bacteriological and Chemical Studies of Lymph. J. Infect. Dis., 41:405, December 1927.

56. Cannon, P. R.; Sullivan, F. L., and Neckermann, E. F.: Conditions Influencing Disappearance of Living Bacteria from the Blood Stream. J. Exper. Med., 55:121, January 1932.

57. Reichel, H. A.: Removal of Bacteria from the Blood Stream; Experiments Tending to Determine Rate of Removal of Injected Bacteria in Blood. Proc. Staff Meet., Mayo Clin., 14:138, March 1, 1939.

58. Lichtman, S. S., and Gross, L.: Streptococci in Blood in Rheumatic Fever, Rheumatoid Arthritis and Other Diseases. Arch. Int. Med., 49:1078, June 1932.

59. Southworth, H., and Flake, C. G.: Blood Cultures After Tonsillectomy. Am. J. M. Sc., 195:667, May 1938.

7. *Relationship of Periodontoclasia to Incidence of Bacteremia.*—It seems logical to assume that the degree of bacteremia varies in direct proportion to the severity of the gingival disease present; yet only Okell and Elliott[27] have reached this conclusion.

In our series of cases, we were not able to find any relationship between the degree of periodontoclasia and the incidence of bacteremia. Table 5 analyzes the percentage of positive cultures in the three classification groups of periodontoclasia. Although control patients with Class II periodontoclasia showed 100 per cent positive cultures, the incidence in Class I was slightly lower than that of Class III. Burket and Burns[21] were unable to find any correlation. We did note that, in Class III periodontoclasia, the teeth to be removed were so loose in their sockets, because of the disease, that frequently they could be extracted with little effort and certainly with no "rocking." Thus, operative trauma, the condition that mainly initiates the bacteremia was not operative, and so high a percentage of positive cultures would not be expected. Gum infection should be kept at a minimum or preferably absent.

8. *Transient Viridans Streptococcus Bacteremia and Its Relationship to Subacute Bacterial Endocarditis.*—The remote effects of a transient bacteremia may present a variegated and widespread clinical picture. Disregarding frank sepsis, with its localization in almost any part of the body, and usually due to organisms other than *Streptococcus viridans*,[60] we shall confine our attention to the delayed effects of the presence of this organism upon the heart valves, or the production of subacute bacterial endocarditis.

The background of this type of endocarditis is found in rheumatic heart disease. Libman[61] first promulgated this concept and, since then, it has been reiterated on numerous occasions.[9, 62, 63, 64, 65, 66, 67] White[68] is of the opinion that approximately 80 per cent of subacute bacterial endocarditis is engrafted on an old valvular lesion of rheumatic origin, while another 5 per cent occurs in congenital cardiovascular defects. Christian[65] found that 90 per cent had a background of rheumatic heart disease. In addition, he notes that almost 5 per cent in his series attacked an apparently normal heart. Christian found that 7 per cent of more than 2,000 patients with rheumatic heart disease developed subacute bacterial endocarditis. Davis and Weiss[66] found that one in ten patients with rheumatic heart disease developed subacute bacterial endocarditis.

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60. Keefer, C. S.: Clinical Significance of Bacteremia. New York State J. Med., 41:976, May 1, 1941.

61. (a). Libman, E., and Celler, H. L.: Etiology of Subacute Infective Endocarditis. A. J. Med. Sc., 140:516, 1910. (b). Libman, E.: Demonstration of Cardiac Lesions of Subacute Bacterial Endocarditis. Proc. N. Y. Path. Sec., 11:118, 1911. (c). Libman, E.: Streptococcus and Influenzal Endocarditis. Med. Clin. N. A., 2:117, July 1918. (d). Libman, E.: Brit. M. J., 2:304, August 28, 1920. (e). Libman, E., and Friedberg, C. K.: Subacute Bacterial Endocarditis. Oxford Loose Leaf Medicine, 1941.

62. Weiss, H.: Relation of Portals of Entry to Subacute Bacterial Endocarditis. Arch. Int. Med., 54:710, November 1934.

63. Keefer, C. S.: Pathogenesis of Bacterial Endocarditis. Am. Heart J., 19:352, March 1940.

64. Lewis, T., and Grant, R. T.: Bicuspid Aortic Valves in Subacute Infective Endocarditis. Heart, 10:21, April 1923.

65. Christian, H. A.: Determinative Background of Subacute Bacterial Endocarditis. Am. J. M. Sc., 201:34, January 1941.

66. Davis, D., and Weiss, S.: Relation of Subacute Bacterial Endocarditis and Acute Bacterial Endocarditis to Rheumatic Endocarditis. New England J. Med., 208:619, March 23, 1933.

67. Middleton, W. S., and Burke, M.: Streptococcus Viridans Endocarditis Lenta; Clinico-Pathologic Analysis of Experience in Wisconsin General Hospital. Am. J. M. Sc., 198:301, September 1939.

68. White, P.: Heart Disease. New York: Macmillan Co., 1937.

Hedley[69] found that 4 per cent of the patients with rheumatic heart disease developed subacute bacterial endocarditis. Elliott,[5] in a study of fifty-six cases of subacute bacterial endocarditis, found that thirteen cases, or almost 25 per cent, gave a history of recent dental operations. Geiger[14] notes that twelve specifically followed tooth extraction and that an additional five others had notations of dental work or disease. We do not think it at all improbable that 50 per cent or more of all cases of subacute bacterial endocarditis may be traced to dental manipulation. Virtually all studies, such as have been quoted, represent analyses of hospital charts. The histories included are frequently inadequate. Rarely is a searching history of prior dental extraction or manipulation in the past year obtained.

Grant, Wood and Jones[70] offer a plausible explanation as to how *Streptococcus viridans* is able to localize on the endothelium of the heart valve. They point out that small platelet thrombi form in the crevices, recesses and projections of thickened valves, apparently on a basis of local secondary change. This is sufficient to offer the *Streptococcus viridans* a foothold. These thrombi act as a lodging and nidus for the establishment of the organism that may be circulating through the blood stream at that time. Friedman, Katz and Howell[71] have, in addition, demonstrated in experimental animals that if *Streptococcus viridans* is protected from the phagocytic polymorphonuclear leukocyte by fibrin, bacterial deposits can grow luxuriantly. The bacteria do not acquire resistance to the leukocytes, nor do the phagocytes lose their power to destroy the organism. It is the protective barrier of fibrin that resists all attempts to destroy the viridans streptococci. Also, typical granulation tissue cannot surround the infected focus on the heart valve and wall it off as it does in foci located in other parts of the body. Keefer[65] believes, in addition, that the presence of antibodies may favor the localization of bacteria.

It should be borne in mind that sequelae, of this nature, of extraction of teeth are relatively rare considering the tremendous number of teeth that are extracted daily by dentists. They do occur, and the diagnosis of subacute bacterial endocarditis is not easy. Frequently, it is not associated with the extraction that took place weeks or months before. Davis and Weiss[66] found the incidence of subacute bacterial endocarditis to be just short of 1 per cent. The percentage of these cases that occur in an apparently normal heart is quite small; but when they call attention to the fact that there is one case of subacute bacterial endocarditis for every four cases of fatal rheumatic heart disease, it quickly becomes apparent that the dentist who extracts teeth in the presence of known rheumatic heart disease is confronted with a serious responsibility. Our figures show that almost 85 per cent of any group having two or more teeth extracted will have a demonstrable bacteremia. Each of these represent a potential case of subacute bacterial endocarditis unless measures can be taken to prevent either the lodging of the organism on the valve, by preventing the bacteremia, or, with its lodgement, to prevent the growth of the nidus before it can be encased in a protective fibrin barrier.

9. *Action and Effect of Sulfanilamide on Postextraction Bacteremia.*—With the advent of sulfonamide therapy, it was soon evident that a drug might be available to suppress the inevitable bac-

69. Hedley, O. F.: Rheumatic Heart Disease in Philadelphia Hospitals. Pub. Health Rep., 55:1599, September 6, 1940.

70. Grant, R. T.; Wood, J. E., and Jones, T. D.: Heart Valve Irregularities in Relation to Subacute Bacterial Endocarditis. Heart, 14:247, August 1928.

71. Friedman, M.; Katz, L. N., and Howell, K.: Experimental Endocarditis Due to Streptococcus Viridans. Arch. Int. Med., 61:95, January 1938.

teremia resulting from dental manipulation. Although the use of a sulfonamide has been advocated in postextraction bacteremia for at least six years, at the present time no study has appeared demonstrating the effect of sulfanilamide therapy.

Sulfanilamide, the first of the sulfonamide group to come into general use, has been the most thoroughly studied of the group, and much that is known of the sulfonamides in general has been derived from observation of its action. Although there is considerable evidence that sulfanilamide is relatively ineffective against the alpha streptococcus group and specifically against the viridans streptococcus, owing to the intertwined relationship of beta and alpha streptococci to rheumatic fever, with subsequent heart disease, and subacute bacterial endocarditis respectively, it was believed that the effect of sulfanilamide therapy on the viridans streptococcus bacteremia demanded first consideration. Reports on other sulfonamides will be published at a later date.

It is generally agreed that the primary action of sulfanilamide is a bacteriostasis, the secondary effect being the disposal of the organisms by means of phagocytosis.[8, 12, 72] This applies, in general, to all sulfonamide compounds, although the exact mechanism of bacteriostasis is still a moot question. Most authorities agree that sulfanilamide causes a diminution in the rate of growth of the organism. This agreement is borne out by our results, since we find no significant difference between the control bacteremia and the bacteremia produced when sulfanilamide was present in a concentration of 5 mg. per hundred cubic centimeters of blood, or more. It would tend to indicate that there is no primary lethal effect on the organisms or that the drug is ineffective *in vitro*, since no effort was made to nullify the effect of the sulfanilamide in culture by means of para-aminobenzoic acid, as was discussed earlier. It was determined that the concentration of sulfanilamide in selected cultures, even after seven days, remains unchanged, this tending to indicate that there was no *in vitro* effect, the organisms being able to grow unimpeded. After ten minutes of circulation in the blood stream, the sulfanilamide is able to depress the percentage of bacteremia to a significant degree, from 33.3 (control, ten minute result) to 13.3 per cent

TABLE 6.—MIXED CULTURES

Case Number	Aerobic Immediately After Extraction	Ten Minutes After Extraction	Anaerobic Immediately After Extraction
	Control Group (I)		
1	Streptococcus viridans Nonhemolytic streptococcus		
4			Streptococcus viridans Staphylococcus albus
7	Streptococcus viridans Staphylococcus albus	Streptococcus viridans Staphylococcus albus	
11	Pneumococcus Staphylococcus albus		
16	Streptococcus albus Staphylococcus albus		
	Sulfanilamide Group (II)		
18	Staphylococcus albus (hemolytic) Streptococcus (unable to isolate drain)		
	Cauterization Group (III)		
	None		

72. Mellon, R. R.; Locke, A. P., and Shinn, L. E.: Anti-Enzymatic Nature of Sulphanilamides Bacteriostatic Action. Am. J. M. Sc., 199:749, June 1940.

(sulfanilamide, ten minute result).

If we consider that, at the onset of the bacteremia, a given number of organisms are released into the circulation by the extraction procedure, we surmise that, in time, these organisms will be removed through the action of the reticuloendothelial system. Quantitative studies have proved of no value, but if it is to survive even ten minutes, the organism cannot remain static. It must be attempting to multiply and gain a foothold in its unwilling host. Thus, a delicate balance is established, with the host slowly removing the invader. Add to the balance the bacteriostatic effect of sulfanilamide, making it almost impossible for the organism to propagate, and where, after ten minutes, it could still maintain itself in a percentage of 33, it now can maintain itself in only 13.

The bacteriostasis appears to have not only a quantitative effect, but an immediate qualitative effect as well. Table 6, listing all mixed cultures, shows that there was only one mixed culture in the sulfanilamide group, while there were six mixed cultures in the control group; a difference that is considered significant. It may well be that the quantitative effect is primary. Where there is a heavy shower of organisms, there is a probability that more than one type will gain entry to the blood stream. When this invasion is reduced to only a few organisms through the action of the sulfanilamide, the organism is more likely to be only one type of bacterium. Another fact to be considered is the specificity of the sulfonamide action on various organisms.[73] It may also be due to the fact that sulfanilamide has no *in vitro* action on the viridans streptococci, since paraminobenzoic acid was not added to the medium to neutralize its *in vitro* action.

Although studies by Long and Bliss,[6] Kolmer[8] and Osgood[74] have shown that sulfanilamide is relatively ineffective against an established viridans streptococcus infection, we believe that, in view of our results, it must be considered to have a definite inhibitory effect, especially during the early phase when the organism has not yet established its nidus. Moreover, Spink[12] has pointed out that sulfanilamide is bacteriostatic against some strains of the alpha group of streptococci. He also calls attention to the contention of some that, in an *in vitro* anaerobic environment, sulfanilamide is markedly bacteriostatic. Our results would confirm that assertion.

Duncan and Faulkner[75] have shown that the sulfonamide group is powerless to penetrate a blood clot; which emphasizes the importance of having a substance like sulfanilamide present in the blood stream of susceptible persons to prevent the organism from being established under a protective fibrin layer. Thomas, France and Reichsman[10] have shown that a small concentration of sulfanilamide can exert a bacteriostatic action sufficient to prevent a recurrence of rheumatic fever. The concentration of sulfanilamide at all times was below what is generally believed the minimum for safety, but it may suffice for inhibiting all but a massive bacteremia (relatively speaking), such as would be precipitated by a tooth extraction.

The importance of sulfanilamide prophylaxis has been amply demonstrated by previous workers,[23, 27] who have shown that organisms are repeatedly

73. Marshall, E. K., Jr., et al.: Comparative Therapeutic Activity of Sulfonamides Against Bacterial Infections in Mice. J. Pharmacol. & Exper. Therap., 76:226, November 1942.

74. Osgood, E. E.: Culture of Human Marrow. Studies of Relative Effectiveness of Neoarsphenamine, Mapharsen, Sulfanilamide, Sulfapyridine, Sulfathiazole, and Sulfamethylthiazole on Infections with Streptococcus Viridans (Alpha Hemolytic Streptococcus). Am. J. M. Sc., 200:596, November 1940.

75. Duncan, C. N., and Faulkner, J. M.: Penetration of Blood Clot by Sulfanilamide, Sulfapyridine, Sulfathiazole and Sulfamethylthiazole. Am. J. Med. Sc., 200:492, October 1940.

found in the blood stream whether tested before extraction or after eating. Ordinarily, the blood stream is promptly cleared of the invading organisms, but, given a susceptible valve in the presence of lowered resistance, conditions are ripe for implantation unless there is present a sulfanilamide concentration sufficient to impede growth.

An illustration of how effective sulfanilamide can be in new infections, before the organisms are embedded in a mass of fibrin, is found in the work of Muether and Kinsella.[76]

Budnitz, Berg and Nizel[13] administered sulfapyridine to twenty-seven patients before "tooth extraction," taking cultures immediately after the extraction and again in from twenty to thirty minutes. All cultures were negative. Since there was no control series, no conclusions can be drawn concerning the value of the sulfapyridine. Northrop and Crowley,[15, 46] in two reports on the same series of cases, used sulfathiazole to prevent postextraction transient bacteremia. They had a control series of ninety-seven cases with twelve (12.8 per cent) giving positive cultures. Of seventy-three patients receiving sulfathiazole, seven (9.6 per cent) had positive cultures.

It will be noted that we insisted on a blood sulfanilamide level of at least 5.0 mg. per hundred cubic centimeters of blood, this level being based on an analysis of available statistics. Spink[12] recommends a concentration of 7.0 mg. Long and Bliss[6] advised giving 90 grains per day for two days before operation and for three or four days after, but they do not mention the blood sulfanilamide level regarded as optimum. An analysis of our results reveals that the blood sulfanilamide level of 5.0 mg. was adequate. Only three cases fell below this level, and they were accordingly rejected. The sulfanilamide level ranged from 5.0 to 11.0 mg. with an average of 7.4 mg. All patients received the same dosage, 80 grains the day before extraction, and 30 grains four hours before extraction. No sulfanilamide was administered after extraction.

10. *Effect on Transient Bacteremia of Cauterization of the Gingival Sulcus.*—Since the cautery not only sterilizes the gingival pocket,[49] but also seals the capillaries of the gingival tissue, thus preventing bacteremia, we deemed it advisable to try it on a small, but selected number of cases. As was previously stated, isolated single-rooted teeth with no periapical infection were used so that the cautery could be applied for the entire circumference and depth of the periodontal pocket. Another feature of using an isolated tooth is that, in the process of extraction, trauma cannot cause pressure on the adjacent gingival pocket and thus have a positive result. Despite these precautions, two of ten cases were positive. These findings are at variance with the results of Fish and MacLean.[49]

The low percentage of positive cultures obtained in the cauterization group may suggest that the cautery can be an effective means of sterilization. The results may be attributed to the fact that the teeth were single rooted and no more than two teeth were extracted at a time. Thus, operative trauma was reduced to a minimum. Although our series was small, the important finding was that results were positive despite the fact that extractions were carried out under ideal conditions of cauterization.

In posterior and multirooted teeth, in cauterization it is difficult to avoid injury to the adjacent periodontal tissues. The use of the cautery is, therefore, limited under practical conditions. No complications, such as infection, dry socket or pain, developed, but a delay in healing was observed.

11. *Recommendations to Minimize*

76. Muether, R. O., and Kinsella, R. A.: Sulfanilamide in Treatment of Experimental Endocarditis. J.A.M.A., 110:603, February 19, 1938.

and Prevent Postextraction Bacteremia.—It is readily seen that although the importance of infection of the teeth and gums in the production of systemic infection has long been appreciated, there exists in the literature a great deal of confusion as to the best method of utilizing this knowledge in the prevention of extraction sequelae, such as subacute bacterial endocarditis. Even in the absence of rheumatic heart disease, the bacteremia produced by extracting or manipulating teeth can localize in various parts of the body and may result in an abscess, an iritis or an arthritis; or it may cause an old quiescent lesion to flare anew.

It should also be noted that, at first, there was no scientific basis for sulfanilamide premedication in contemplated tooth extractions other than the fact that the drug was known to be bacteriostatic for most of the flora of the mouth. At the time that our experiments were carried out (1940-1941), there were no reports in the literature concerning the effect of sulfonamide therapy on actual postextraction bacteremia. Recently, there have been such reports, but, in all cases, the results have been negated by the low percentage of positive control cultures.

The following régime is, we believe, advisable in the extraction of teeth, if the occurrence of bacteremia with its subsequent complications is to be eliminated:

1. Physicians should warn patients known to have rheumatic heart disease about the complications that may follow tooth extraction. Such patients might well be further advised as to the necessity of both medical and dental supervision during all contemplated dental procedures. Dentists, especially exodontists, should elicit any history of rheumatic fever, chorea, scarlet fever, joint pains, "growing pains," frequent sore throats or manifestations of the rheumatic diathesis. It cannot be too strongly stressed that these patients should be seen by a physician in consultation with the dentist.

2. General anesthesia is to be avoided. A local anesthetic such as procaine plus epinephrine, infiltrated into the tissues, is the anesthetic of choice.

3. Only one tooth is to be removed at a time, and with a minimum of rocking and trauma. Any manipulative procedure involving either the gums or the teeth is to be avoided, especially in patients known to have rheumatic heart disease.

4. A sulfonamide should be administered twenty-four hours before extraction and for from twenty-four to forty-eight hours after extraction in order to assure maximum protection. It is doubtful whether it is necessary to administer the drug beyond the forty-eight hour period, especially if no more than a single tooth is removed. In view of our findings, it may not be necessary to administer any of the drug after extraction. If sulfanilamide is given, enough should be supplied to raise the blood level to over 5.0 mg. per hundred cubic centimeters. This will require between 90 and 110 grains of sulfanilamide in the twenty-four hours before extraction. This dosage was so planned that the optimum blood concentration of sulfanilamide occurred at the time of extraction and continued for a few hours thereafter.

SUMMARY

1. Sulfanilamide exerts no immediate quantitative effect on bacteremia following extraction of teeth, but does show a significant quantitative decrease in organisms that have circulated in the blood stream for ten minutes. The bacteriostasis appears to have not only a delayed quantitative effect, but also an immediate qualitative effect.

Aerobically, sulfanilamide *in vitro* exerts no bacteriostatic effect. Anaerobically, it has a marked bacteriostatic effect.

2. The cauterization of the gingival

sulcus is not an effective means of inhibiting bacteremia.

3. Sodium polyanetholsulfonate 0.033 per cent in brain-heart infusion media is probably the most important factor in isolating organisms that enter the blood stream. Ordinary media are not sufficient. The media must be sensitized by the addition of a substance that will enhance growth. It is also important not to use too large a quantity of medium; otherwise, the chance of survival of the organisms is lessened.

4. The most predominant organism that was recovered was the viridans streptococcus.

5. Procaine with the addition of epinephrine is the anesthetic of choice because it is believed to increase the body defenses to a slight degree. Used in small quantities (less than 10 cc.), it will not inhibit the action of the sulfonamides.

6. Only one tooth should be extracted at a time and "rocking" is to be avoided. Violent manipulative procedures are likewise contraindicated, such as curetting and excessive scaling.

7. Gum infection, although a secondary factor, should be kept to a minimum. If present in a severe degree, it should not be considered as increasing the risk of extraction.

8. Use of one of the sulfonamides in adequate concentration at the time of extraction is an absolute necessity. Once the organism becomes embedded in the heart valve under a protective layer of fibrin, the sulfonamides are ineffective. If sulfanilamide is used, a blood concentration of at least 5 mg. per hundred cubic centimeters is required at the time of extraction.

9. Organisms are believed to gain access to the blood stream through the gingival crevice, being "pumped" and aspirated into the ruptured blood vessels, mainly by the "rocking" action of the tooth during extraction.

10. Organisms, mainly the viridans streptococcus, gain access to the circulation, not only during the process of extraction, but also during the act of mastication.

At such time, they may lodge on a roughened valve, previously damaged by the rheumatic diathesis. Once surrounded by a fibrin layer, the organism may grow unhampered, being protected from the main defenses of the body, such as phagocytosis.

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A PROPOSAL FOR GROUP PRACTICE IN DENTISTRY

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American dentistry, in its national, state and local organizations, offers many manifestations of deep concern as to how the profession shall best meet the challenge of the postwar era. It should be said at once, however, that the war has merely brought into sharp focus needs and trends in dental practice already in the making. Many of us believe that whatever postwar plan of dental practice finally evolves will be the result of a long steady process, and that it will represent evolution rather than revolution.

This is not to say that certain fundamental changes in dental practice are not needed. The changes needed, however, are radical only in the way in which they provide for different and more efficient forms of utilizing our

present resources. They are developmental rather than fundamental changes. Few will dispute the thesis that some way must be developed for getting better dental service and service to a great many more people than now receive or apply for dental care. This article is concerned with some of the ways in which this objective might be achieved. The heart of the proposal is the group practice of dentistry, with fractionation of the mechanical part of dental work—both of these to be set forth more fully hereafter.

This is not the first presentation of the proposal that forms the basis of this article. Several years ago, when it was clear that the Selective Service System and the Army were faced with a huge problem of dental rehabilitation, this proposal was offered to these authorities in the belief that it would insure a better solution of the military dental problem than was achieved, for instance, during the last war at Camp Upton, where I served in the dental force. The proposal was given serious consideration by the military authorities and, when it was finally decided that the plan could not be put into military operation at that time, the rejection was accompanied by the opinion that the plan was adapted to dentistry as a public health problem and that it should be tried in civilian life. The plan was brought before the Pepper Committee* and has been presented to leaders in dentistry, medicine and social economy, who, feeling that experiments in the group practice of dentistry should be tried, have formed a committee of sponsors,† advocating experimentation on the basis of this plan.

It seems to me important that American dentists themselves should work out and present the plan designed to meet the present dental needs of the nation, whether present or postwar. It seems quite clear that if American dentists do not undertake this task, others will assume it, for there are at work urgent forces which forecast action of some kind. When 95 per cent of the people need service as definitely as they now need dental care, something will be done about it. When more than 20,000 dental officers are demobilized, something will be done about it. It behooves the dentists themselves to direct and do what is to be done, providing for definite experimentation in the most hopeful possibilities and ceasing to rely upon the literary expression of progressive attitudes at annual meetings and in our dental journals.

These are the problems: (1) to find a way of getting dental care to the 80 per cent of the population that now receives none; (2) to find ways and means of making the benefits and imperative need of dental rehabilitation clear to the millions who now have no conception of this; (3) to meet the further problem caused by the fact that a vast number of people cannot afford high-grade dental care, if they can afford any at all; (4) to establish on a national basis a progressively expanding children's program, aimed at the kind of preventive dental service that would make impossible the situation revealed by the first draft, in which 200,000 of 1,000,000 men were rejected for dental defects alone; (5) to develop the dental personnel and manpower to do the country's dental job on a national basis, since

*A subcommittee of the Senate Committee on Wartime Health and Education.

†The committee of sponsors includes: J. L. T. Appleton, D.D.S., vice chairman, dean, School of Dentistry, University of Pennsylvania; Finn J. Bronner, D.D.S., College of Dentistry, New York University; Charles L. Hyser, D.D.S., chairman; Esther Everett Lape, American Foundation, Westbrook, Conn.; John Oppie McCall, secretary, Guggenheim Clinic, New York City; J. Raymond Walsh, vice chairman, Economic Advisor CIO, New York City; William C. Webb, Jr., D.D.S., director, Philadelphia Mouth Hygiene Association, Philadelphia, Pa., and Milton C. Winternitz, M.D., Yale Medical School, New Haven, Conn.

there are not even one-third as many dentists as would be required if the nation's whole dental need were to be met, and (6) to incorporate, in any new ways that may be explored by providing good dental care, the four principles established by the American Dental Association.

Unless dentists prove themselves capable of devising a comprehensive practical plan, we shall have plans from various sources and with complex motivation presented to us, and very possibly forced upon us. These plans will range from patchwork proposals to have the government subsidize the training of one-third more dentists than now exist to proposals such as the Wagner-Murray-Dingell bill. This bill did not propose to solve the dental problem of the country. It merely accorded the country's dental needs a certain honorable mention by proposing a two-year "study" of the problems involved in providing adequate dental care to the population. It is in the legislative tradition to propose a study of these subjects with which the framers are unable to deal. It is my opinion that there are now in American dentistry forces competent to present a statement of needs and to evolve experiments for meeting them without two years additional study. Dentists have a responsibility for preparing now a plan for dental practice that will take into account the dental needs revealed by the draft; the need of preventive dentistry for the whole population through an adequate children's program, and the need of using to the utmost the dentists now in practice and those who will be demobilized. The latter represent about one-third of all the dentists in the country.

All of us salute legislators who reveal a knowledge of social needs. No bill in the pattern of the Wagner bill will solve the dental problem of the country because it is based on social theorizing rather than on a scientific approach to a profound scientific problem. The Wagner bill is in the familiar pattern of proposals by those who feel that every new social problem can be met by extending insurance provision to cover it. The chief concern of the Wagner bill is to work out ways and means by which people can pay for medical care. What is needed first, however, is to achieve, on a nation-wide basis, medical and dental care that are worth distributing and worth paying for. I propose that instead of working out any more government-aided insurance schemes, in the German tradition of the last generation, we direct government initiative toward ways and means of providing adequate and scientific dental and medical care on a basis that will make it possible to reach the millions at present untouched. Whatever aid it is necessary for the government to give should be made available through direct taxation. Social insurance is a patriarchal rather than a democratic pattern. It is not in the American tradition.

There is another way. We have it in our power to work out a sounder relation between government and medical and dental science, a relation that will provide high-grade care for all, at practicable costs, met by the individual and supplemented by direct health taxation —not by the indirect taxation of insurance, and not by the unsound application of the theory of hazards and percentages to a need that affects the whole population at all times. The development of preventive medicine and preventive dentistry, which, in the long run, is the only rational definition of "adequate" medical and dental care, has nothing to do with the principles upon which social insurance is based. Social insurance is based on the principle that illness is a hazard, a calamity that does not come to all, and that it is possible to work out, on the law of averages, a scheme by which the money saved on those that are not ill can be applied to

the care of those that are ill. It is an unsound principle. Preventive medicine and preventive dentistry are needed by all. They are logical objectives of direct taxation and they are not logically subject to intricate schemes based on the law of averages.

The plausible contention is, of course, that voters find indirect taxation more palatable than direct taxation. This seems to be an unwarranted assumption. In the course of history, the voters have learned to pay willingly for what they want.

I want to see any dental bill along the lines of the Wagner-Murray-Dingell bill defeated by a sound and comprehensive proposal emanating from American Dentistry. Such a proposal will need to take into account how the 95 per cent of the population that needs medical care is to pay for it; but an adequate dental proposal must do much more than envisage the consumer's difficulty in paying for dental care. It must insure the existence of sufficient dental care of the highest order to meet the nation-wide need. This objective, the Wagner bill pattern, with its preoccupation with the consumer's problem of payment, does not meet.

On what principles, then, shall we evolve a plan that will make it possible to stretch our present obviously inadequate resources to cover an expanding national need? I believe that however we may disagree on administrative details, we must admit that the only principles that will achieve this end are those I have mentioned above; i.e., the group practice of dentistry and the fractionation of much of its mechanical procedure. The most highly developed experiments in medical practice, i.e. the teaching hospitals with the associated medical schools, and groups such as the Mayo Clinic, have conclusively proved that group practice results in infinitely better medicine.

In dentistry, there is particular reason for group practice. There is need for a group of experts, in such a dental clinic as I propose, for diagnosis and for charting dental work, in every case on the basis of the whole mouth. The members of this diagnostic and supervising group would have to be more highly trained in dentistry and medicine, expert in the basic sciences. This diagnostic and supervising group would be responsible at all times for the quality of the dental care provided by the clinic. It would be responsible for the basic research that must be associated with such a clinic, and for the type of medical education to which the clinic would contribute.

Division of the operative work of the dental clinic proposed especially lends itself to the application of the group principle. Many of the procedures in dentistry are mechanical procedures. They require expertness, but they are high-grade mechanical practices that lend themselves readily to the principle of fractionation. With the large number of patients contemplated in the clinic plan, young graduates could be used in the various mechanical procedures. They would become progressively expert in every operation and, by careful rotation, the training of every man could be rounded to include every form of operative work. Nor is it to be for a moment forgotten that these operators would work under the expert direction of the diagnostic and supervising group of highly and broadly trained men. If this is borne in mind, the criticism that the plan proposed would "mechanize" dentistry or lower its standards has no relevance. Clearly, every operator concerned could not fail to achieve a broad gain in competence and in scientific understanding of the way in which his work fits into the whole picture. There would be no substandard dentists anywhere in this plan. I am definitely opposed to the use of any but competent graduate dentists in dental work. I

think, however, that we should consider the possibility of using properly trained assistants where they can be effectively used to increase the efficiency of the operating dentist. In the practice of dentistry, there are many minor services which trained assistants could offer and which would save the operating dentist time and energy.

No "mechanizing" of the profession is involved in group practice. The plan contemplates more comprehensive and more intensive dental work for every case. The increase in volume of work involves no sacrificing of quality to quantity. It is obvious that great numbers of patients and efficient fractionation of mechanical procedures will greatly increase the amount of work done, and sharply lower its cost. It is very likely that most of the illustrative figures used in the plan would be revised upward or downward. The important consideration is the soundness of the principle that time and money will certainly be saved by (1) a large volume of patients, (2) reduction of overhead and equipment resulting from group practice and (3) maximum output for each operator achieved by efficient fractionation of work. Too much stress cannot be laid upon the fact that while there are many economic and practical reasons for urging group practice, the outstanding argument for group practice is the fact that it will lead to better dentistry, a better and more biologic type of health service. The advantages arising from the saving of time and the lowering of cost to the patient are "byproducts" rather than the real argument for group practice.

In summary, then, the principles upon which the plan rests are: (1) expert and complete charting of the needs of the mouth as a whole, for every case that the clinic admits; (2) fractionation of the dental work and organization of mechanical procedure, and (3) expert supervision at every stage.

In this conception, the group practice of dentistry insures better dental care for every case, the proper relation of medicine to dentistry and the maximum savings in time and money, with vastly lowered costs to the consumer. By way of concrete illustration: Approximately 100 dentists could care for 30,000 badly broken-down mouths per year, with complete rehabilitation. If we figure, for example, on a 300-day year, that would mean 100 patients a day. Roughly, in prosthetic dentistry (bridgework and platework) a group of eight operators might consist of two taking impressions (with the new colloid impression material, it is easily possible to take five impressions for bridges or partial dentures per hour, if everything is ready and the inlays are fitted and completed), two taking bites and choosing the colors and four fitting the bridges and dentures. This prosthetic group would be capable of finishing ten partial dentures or bridges per hour, or eighty in an eight-hour day. When costs of material, equipment and salaries (even good salaries) are divided by the 30,000 patients, it must be clear that savings would be immense. The effectiveness of the clinic proposed is of course dependent on large numbers of patients. It should be added that there are certain problems to which the fractionation system would not be adaptable, for instance in deep and complicated cavities (which would too greatly slow up the line), root canal work, bite restoration and edentulous mouths. These may require individual attention and treatment, which would be provided for and carried out in the proposed line.

Some of the critics of my plan, evading consideration of the principles involved, have devoted all their energies to attacking one or another of the foregoing figures. The proposal, let me hasten to say, is based not upon particular figures, but upon the soundness of the principle that fractionated and co-

ordinated work by men whose expertness increases daily definitely shortens time and lessens cost. This economic principle was advanced by Adam Smith in 1778 and has been demonstrated many times since then. By and large, I consider the illustrative figures that I have used conservative. The important consideration, however, is that they are illustrative and can be made final only through experimentation.

The principle of the plan outlined applies, with certain obvious omissions and differences, to the operation of a children's clinic. In dental work with children, prosthetics is almost nonexistent except for accidents, but the operative work is the same. The crown of a child's permanent tooth is formed, finally and completely, when it erupts and, if it decays, it should be filled with a permanent material. That is far more economical than refilling the tooth every few years because of leaky or changing materials. X-rays show up cavities long before they endanger the pulp, and if the pulp does not become involved, infection of the root cannot develop. A vital tooth never develops an apical abscess, and thus extraction and the resultant bridges are avoided.

To orthodontia in children, the principle of fractionation of work is easily applicable. The most important factor in orthodontics is diagnosis, and the next factor in importance is the logic of basing the treatment on dental need and not on the financial background of the patient. One man could plan and control the treatment of fifteen or twenty subordinates in a children's clinic with little trouble. Apparatus could be made in a laboratory by technicians. By such methods, orthodontia, instead of being the luxury it now is, could be dropped into a class of work available to every child.

How is the patient to pay for the high-grade comprehensive dental care provided by the proposed clinic? Clearly, since preventive dentistry for all is our concern, the popular hospital insurance plan, which rests upon the premise that only a part of the population is going to need hospital care and that most of the others need it only at rare intervals, is not pertinent. It would be possible, however, to build up a membership organization on the basis of average costs. For the sake of discussion, let us assume that the fee for individual membership would be $10, for which a member would receive full x-ray examination, careful prophylaxis, possibly some minor surgical service and a thorough examination and complete diagnosis. On the basis of this diagnosis, the patient would have outlined to him the amount of work needed for rehabilitation of his mouth at that period. The amount of dental care needed varies in all patients, and since an average cost would be unfair and impractical, the mouths the condition of which was thus diagnosed would fall into one of possibly three classifications of needed work:

Group A: x——number of fillings.
x——number of extractions.

Group B: x——number of plastic fillings.
x——number of inlays and possibly some restoration.

Group C: All cases which do not fit into the two former groups.

The A, B and C groups would be charged different fees, the exact amount of which could be established only by experiment, but which might possibly be $20 to $30 to $40, respectively. After rehabilitation, the mouth would be maintained in a healthy condition, on an annual basis, for a yearly membership fee of $5.

The comprehensive, thoroughly scientific dental care that is needed can never be provided to 100 per cent of the population on the basis of the individual practice of dentistry. I propose the cooperative organization of our dental per-

sonnel and facilities at this time, on the initiative of American Dentistry, as the only healthy and effective means of offsetting schemes for regimenting the practice of dentistry without fundamental benefit to the consumer, to the dentist or to the science of dentistry.

While this article has been chiefly concerned with illustrating the concrete working out of the group practice of dentistry, implicit in every part of the plan is the impact that group practice will have on dental education and dental research. The clinics proposed cannot help becoming the postgraduate centers of the country and as such they will necessarily influence the undergraduate curricula, which will produce the dentists of the future. In the field of research, the clinics offer opportunities for research data and research interest not available in the system of individual practice. For research purposes, the clinics should be operated on the basis of records to be worked out by a group of scientists, involving, for instance, the disciplines of dentistry, medicine, chemistry, physics, anatomy and anthropology. These scientifically devised and uniform records covering thousands of patients would prove or disprove many observations that are now matters only of speculative theory. Through such research, the group practice of dentistry will directly minister to achieving and maintaining the integrity of dental science.

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MAXILLARY SINUS SURGERY VIA A CALDWELL-LUC WINDOW*

George W. Christiansen,† A.B., D.D.S., M.S., and James L. Bradley,‡ D.D.S., M.S.D., Bethesda, Md.

When oral exposure of the antrum is necessary, a Caldwell-Luc window is of great value. In a dentulous mouth, the flap for this is made by separating the gingival tissue at its attachment. In an edentulous mouth, an incision is made along the crest of the ridge.

Following are reports of two cases in which this approach was used: Case 1, that of a chronically diseased antrum, in which the radical operation was performed, and Case 2, removal of a third molar from the antrum following accidental entrance.

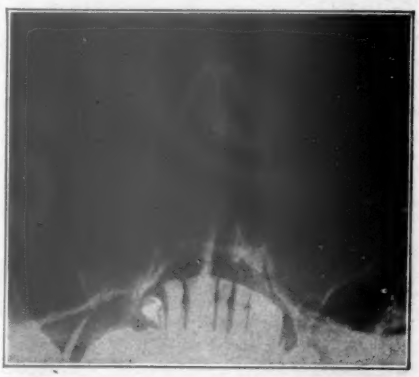

Fig. 1.—Anteroposterior roentgenograms showing right maxillary sinus completely filled with tissue of soft tissue density.

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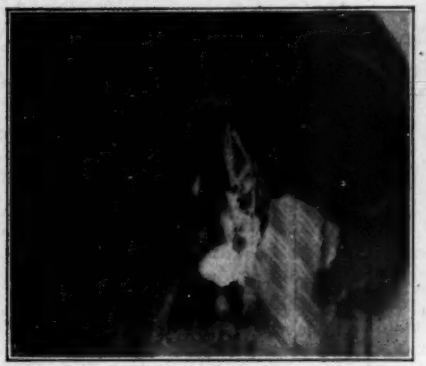

Fig. 2.—Roentgenogram showing presence of lipiodal in right maxillary sinus.

Fig. 5.—Antrotomy window under inferior turbinate, made with rasp. The end of the instrument can be seen through the window.

Fig. 3.—View, with flap lifted, through Caldwell-Luc window, of diseased antral contents.

Fig. 6.—Cannula passed through artificial window into antrum.

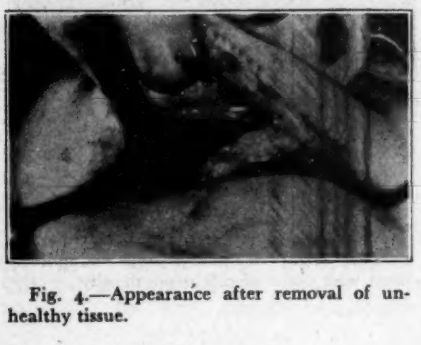

Fig. 4.—Appearance after removal of unhealthy tissue.

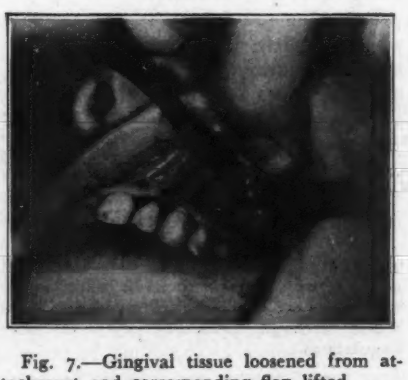

Fig. 7.—Gingival tissue loosened from attachment and corresponding flap lifted.

Fig. 8.—Caldwell-Luc window.

Fig. 10.—Tooth removed from maxillary sinus with forceps.

Fig. 9.—Tooth moved forward toward anterior opening.

Fig. 11.—Postoperative appearance of gingival tissue day after removal of tooth.

REPORT OF CASES

CASE 1.—*History.*—A.C., a man, aged 45, for the past several years had noticed a recurring unilateral nasal discharge and postnasal drip, particularly evident after a slight cold.

Physical Examination. — December 30, 1943, the blood pressure was 138/78; pulse rate 120. The patient looked older than his stated age, and had a moderate pallor. He appeared to be chronically ill, but was fairly well nourished. There were redness, excoriation and a thick moist purulent discharge from the left auditory canal. The drum was not visualized. The right drum was scarred, partly reddened and retracted. The teeth were in poor condition, discolored, with many teeth missing, many areas of caries and redness of the gum margins. No purulent material could be expressed. The throat was diffusely reddened and the conjunctiva injected. The heart sounds were normal.

February 14, 1944, a roentgenographic examination of the accessory nasal sinuses showed that the frontal sinuses were well developed and clear. The ethmoids appeared somewhat cloudy, especially on the right. The right maxillary sinus was completely filled with tissue of soft tissue density. On the left side, there was marginal mucous membrane thickening and a polypoid-like mass projected from the inferior portion of this antrum.

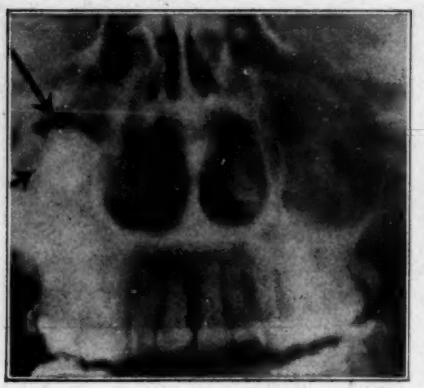

Fig. 12.—Anteroposterior roentgenogram of tooth in sinus.

Fig. 13.—Lateral roentgenogram showing tooth in midposterior area of left maxillary sinus.

Periodontosis was extensive and removal of all teeth was advised.

On removal of the maxillary right second molar, a small opening was observed extending into the adjacent maxillary sinus. Although this was covered by a flap of soft tissue held in place by sutures, the antra-oral fistula did not close, but instead became filled with unhealthy granulation tissue.

The antrum was believed to be diseased and an anteroposterior roentgenogram revealed that the right antrum shadow was dull except for a small central portion. (Fig. 1.)

Lipiodol was injected through the antra-oral opening. Figure 2 shows the small amount of pneumatic space remaining. The clinical diagnosis was chronic right maxillary sinusitis with antra-oral fistula.

Operation.—Under regional anesthesia, an incision was made along the lateral surface of the alveolar ridge at the attachment of the mucobuccal fold and a corresponding flap was lifted. The bony fistula was enlarged with a bone rongeur and a Caldwell-Luc window made. The antrum was almost completely filled with polypoid tissue and the lining membrane was hyperplastic to a high degree. (Fig. 3.)

This pathologic tissue was completely removed (Fig. 4) and, to provide ventilation and drainage, an antrotomy was performed through the naso-antral wall under the anterior end of the inferior turbinate. (Figs. 5-6.) The flap was lowered and sutured loosely.

Laboratory Data.—The specimen consisted of ten irregular, nodular fragments measuring from 1 to 3 cm., some pale pink, soft and boggy; others, dark-brown, firm and papillary.

Cross-section showed respiratory epithelium beneath which was edematous connective tissue infiltrated by wandering cells and clotted blood. The diagnosis was chronic inflammation of the respiratory mucous membrane.

Progress.—Except for slight edema and soreness on the right side of the face, there was no postoperative distress. The fistulous opening did not recur and the nasal discharge ceased.

Comment.—A persisting antra-oral fistula is definite evidence of a diseased maxillary sinus. Treatment of the fistula *per se* is futile without treatment of the antrum, which demands wide exposure and complete removal of all diseased contents. In addition, provision needs to be made for ventilation into the nose and restriction of all communications with the mouth.

CASE 2.—*History.*—A woman, aged 22, admitted to the hospital in an ambulant condition, stated that the upper left third molar, which was unerupted and impacted,

had, during its attempted removal, moved upward out of the sight of the operator. Roentgenograms made immediately had indicated that it was in the antrum.

Examination.—There was slight fever present and, in the maxillary region, slight edema. Anteroposterior and lateral roentgenograms (Figs. 12 and 13) revealed the maxillary left third molar in the midposterior portion of the left maxillary sinus, in an inverted position.

Operation.—Under regional anesthesia, the gingival tissue from the maxillary left cuspid posteriorly from the tuberosity was loosened from its attachment and a corresponding flap was lifted. (Fig. 7.) A Caldwell-Luc window was made through which the tooth could be seen (Fig. 9) and recovered (Fig. 10). The location and size of the window are shown in Figure 8.

The flap was lowered and was pressed lightly into position. Sutures were not used. Figure 11 is a postoperative view taken the following day.

Comment.—If a liberal flap is lifted carefully without cutting gingival tissue, and an adequate window, Caldwell-Luc style, is made, excellent access to the contents of the maxillary sinus is afforded.

This method rigidly avoids trauma or injury to the tooth socket, which is an important factor in rapid healing and in the prevention of an antra-oral fistula. It also assures a minimum of postoperative discomfort because soft tissues are not incised and divided.

FIBROUS EPULIS: REPORT OF CASE

Rollo J. Sample, D.D.S., and Chester H. Swanson,† D.D.S., Baltimore, Md.*

Among the more common tumors of the mouth is the connective tissue tumor of the homologous type arising from the osseous tissue (or the periosteum) of the buccal cavity, known most frequently as an epulis. This term is often carelessly applied. The word itself means only "upon the gum." It is a gross clinical term referring to a group of tumors, and when used should have some descriptive adjective before it such as: fibrous, sarcomatous, giant-cell or angiomatous.

These fibromas are found most frequently on the buccal surfaces of the gum of the alveolar process. They may originate in the crest of the alveolar ridge between the teeth, often forcing apart and loosening them. They occur usually in the vicinity of the anterior teeth. Very seldom are they found about the molars. They are never found in children under 6 years of age, but may occur at any time of life, although most commonly they seem to correspond in occurrence with the shedding of the deciduous teeth. There seems to be some relationship, therefore, between this process and the cause of the tumors. Geschickter and Copeland[1] express the opinion that there is a periosteum about the roots of the deciduous teeth that normally has the power of osteoclasia, this being Nature's provision for the shedding of the deciduous teeth, and that epulides may, in certain cases, arise from this tissue.

Other workers (Targett[2]) believe congenital influences have something to do with the formation of these growths. Targett suggests that they may have their origin in some embryonic rest remaining at the point of fusion of the halves of Meckel's cartilage, or may arise from the sutures existing in the embryo between the maxillary and premaxillary bones.

It is possible, too, that some trauma-

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Fig. 1.—Fibrous epulis.

Fig. 3.—Model of mouth before removal of epulis.

Fig. 2.—Model of mouth before removal of epulis.

Fig. 4.—Model of mouth eleven days after removal of epulis.

tism or chronic irritation may stimulate the tissue to overgrowth, these tumors resulting. They are found three times as frequently in females than in males, but the reason for this is unknown.

These neoplasms grow slowly and usually give rise to very few symptoms. They can be annoying, because their position and bulk make irritation by toothbrushes and hard foods common. Frequently, they will show superficial ulceration from such trauma, and subsequent infection.

Histologically, three main types may be differentiated. The most common is the fibrous epulis, sections of which exhibit dense bundles of connective tissue fibers, few blood vessels and scanty lymph spaces, containing for the most part spindle cells with laterally flattened nuclei. Occasionally, there may be some round-cell infiltration. Clinically, this type is recognized by its firmness and tendency to nodular conformation. The mucous membrane covering them is, for the most part, normal in appearance, though at times it may appear smooth and a trifle redder.

The second type is the angiofibromatous epulis. Histologically, they have a somewhat embryonic aspect, resembling that of newly forming connective

tissue. The vessels are large and numerous and the cells are numerous and are rather round or oval than spindle shaped. Clinically, they are rather soft and spongy and their mucous covering is more often dark or purplish. They grow more rapidly than the fibrous type.

The third type is the benign giant-cell epulis, which is almost as common as the fibrous type. Sections of these, as the name implies, show numerous giant cells of the foreign body type with numerous nuclei, sometimes as many as fifty to 100. Clinically, they are smooth and soft and covered with a dark red mucosa.

A differential diagnosis between these tumors and other tumors of the mouth must take into consideration (1) their slow growth, (2) the lack of accompanying symptoms, (3) the lack of tendency to ulcerate deeply and early and (4) their covering of smooth mucosa. If malignancy is suspected, a section for microscopic examination can be removed with a cautery knife.

Fig. 5.—Model of mouth eleven days after removal of epulis.

Although these tumors are mostly benign, they may, rarely, undergo a malignant degeneration, ulcerate and start to grow rapidly. They frequently recur, though the recurrence is local. Therefore, at the time of removal, the bases or pedicles of these growths should be thoroughly excised, the involved periosteum removed and the area carefully curetted. It is advisable to remove teeth in any way directly involved in the mass.

REPORT OF CASE

History.—A man, colored, aged 32, who reported to the dental clinic for routine dental examination, presented a large mass arising from the anterior maxillary area and extending from the region of the right lateral incisor across the midline to the left lateral area. The four incisors were missing, having been removed five years before because they had gradually loosened and become annoying. The tumor was round and smooth with a sessile base, covered with a glistening mucosa that was a little darker than the normal gingival tissue, and measuring at the base 19.5 mm. horizontally and 15 mm. vertically, extending outward 16 mm. (Figs. 1-3.) The patient stated that the mass had been present as long as he could remember, but he had noticed that it had grown larger since he received a blow in the mouth with a heavy wooden beam while working in a shipyard two years before the present examination. It apparently caused him no trouble except that it made his upper lip bulge.

Examination.—The x-ray examination was negative. The condition of the mouth was extremely poor hygienically and all of the teeth had to be extracted because of periodontoclasia.

Operation.—The teeth were removed first and when the mouth was fairly well healed, the fibroma was removed under procaine anesthesia. The incision was made approximately 5 mm. outside and completely around the base of the growth and down to the bone. The entire mass was removed and the site curetted carefully. A layer of vaselin gauze, placed over the wound and sutured firmly by means of modified mattress sutures, was allowed to remain for a period of five days.

Biopsy Report.—Fibrous tumor with no round cells present was reported.

Course.—On removal of the gauze, the bone of the entire site of excision was found to be covered with a layer of normal granulation tissue. No further dressing was used, and the patient was instructed to use a warm saline mouth wash frequently. He was seen daily at the clinic, where the area was swabbed clean and tincture of merthiolate

applied. Healing was uneventful. (Figs. 4-5.)

The patient was not hospitalized and he is now wearing full upper and lower dentures.

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MANAGEMENT OF MANDIBULAR BONE LOSS

Lee R. Kulick, D.D.S.*

The most striking feature of the surgical treatment of war casualties in the present conflict is the conservation of viable tissue as the first step in preparation for reconstructive plastic surgery and prosthesis. The practices established in forward surgical echelons demonstrate, by their results, the wisdom of such procedure. Immobilization of movable fragments and conservative débridement initiated by auxiliary surgical and maxillofacial teams in the mobile hospital installations are two features that are extremely important in determining the ultimate prognosis of maxillofacial injuries. Although many devices are utilized for the achievement of these two basic principles, the dominating effort is toward immediate fixation to promote physiologic healing and to maintain the optimum soft tissue tone in preparation for plastic surgical procedures in the rear echelons. Especially is this true in the case of loss of tissue substance, when Nature endeavors to organize a fibrous union to obliterate the artificial space created by the separation of anatomic parts. Unfortunately, this often results in marked contracture of soft tissues plus the disfiguring aftermath.

The particular case in mind is the potentially defacing injury involving the loss of bony substance of the mandible. Some of the worst deformities result from the loss of part of this buttress, which determines the general facial configuration. The cartoon character "Andy Gump" portrays this type of case. The appliances to be described represent a combination of several already in use. The underlying principles are rigid fixation and the maintenance of correct relationship of the separated parts.

In Figure 1, collapse of the mandible as a result of muscular contraction is, one can see, inevitable. The contracture of the median line scar only serves to exaggerate the condition. The tension created would be a difficult problem to a plastic surgeon in his effort to remedy the soft tissue defect as well as that of the bony space. Any appliance constructed must be of sufficient rigidity to keep the bony fragments separated and in correct position, plus meeting the second requirement, minimizing the scarring tendency of soft tissue healing. To assure these features, the following design was suggested by Dennis Glucksman.†

Impressions are taken of the teeth and adjacent gingiva of the separate mandibular fragments, using materials that can

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be placed without undue pressure. It may be difficult to utilize ordinary manufactured trays. One of our staff at the hospital has succeeded in fashioning acrylic trays that can be adapted to the individual case. These serve the purpose admirably. An accurate impression of the maxilla is also taken and the three impressions are then poured in artificial stone.

Fig. 1.—Collapse of mandible after injury.

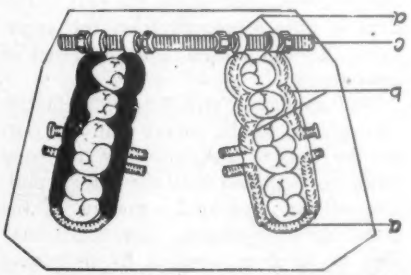

Fig. 2.—Left side outlined to show metallic framework; right side representing splint waxed before flasking. *a*, heavy steel wire of posterior metallic framework. *b*, anterior metallic framework terminating in two eyelets (d). *c*, long threaded bar uniting separate segments.

The individual sections of the mandible are articulated and firmly waxed to the upper cast. Stone is then poured between the two lower sections so as to make one model uniting the separated segments. The lower model is separated from the upper and the laboratory work is continued.

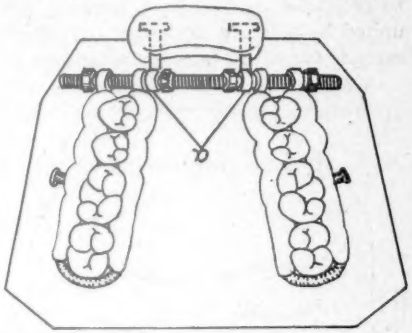

Fig. 3.—Stent attached to connecting bar by eyelets (*d*).

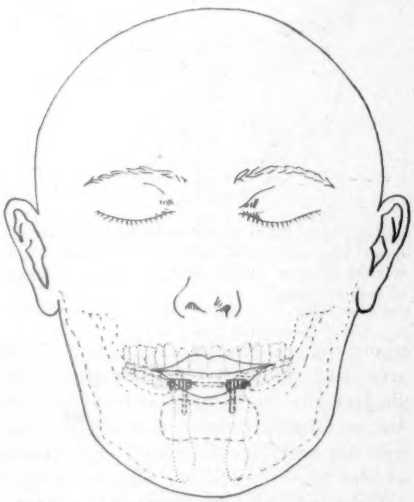

Fig. 4.—Appliance inserted with stent attached.

The facial and lingual surfaces of the lower teeth are heavily waxed (Fig. 2), overlapping the gingival border for about 0.5 cm. to insure a peripheral seal. The

wax should permit a clear view of the occlusal surfaces so as not to interfere with masticatory function.

The anterior portion of the appliance is open for about 0.75 cm. to permit adjustment of the screws, while the posterior facial and lingual portions are united by a heavy steel wire (*a*) which extends out of the wax for a distance of about 0.5 cm. facially and lingually. The free ends imbedded in the plaster in flasking the model prevent movement of the metal in processing the acrylic. The anterior metallic framework (*b*) consists of two heavy cast silver wires imbedded in the wax and extending out of the wax at their proximal ends for a distance of 0.5 cm. from the facial and lingual aspects. These free ends are also imbedded in the plaster and aid in maintaining the position of the metal parts. The distal ends terminate in two eyelets (*d*), through which a long screw (*c*) is passed, uniting the separate segments of the appliance. The long screw (about 0.4 to 0.5 cm. in diameter) should be placed so as to be perpendicular to the median line of the mandible. The portions of the steel and cast silver bars that are to be imbedded in the acrylic should be roughened so as to permit a firm anchorage.

Fig. 5.—Extent of mandibular injury when bone was shattered bilaterally, more so at wound of exit (left) than at point of entry of bullet (right).

The model is then relieved around the heavy steel wire at the posterior end of the appliance to insure against movement in the processing of the acrylic. The long screw is withdrawn and the case is flasked in the regular manner. Transparent acrylic is used and the case is processed and finished. At this stage, the free ends of the metallic framework can be cut off or reshaped to provide anchorage for intermaxillary wiring, if increased rigidity of parts is desired.

After the appliance has been fitted to the mouth, two vertical posts are threaded on to the long screw (Fig. 3), their eyelets (*a*) lying between the inner nut and the inner eyelet of the splint proper. To these vertical supports is attached a bulk of wax sufficient to fill out the anatomic contours of the chin. The stent is then separated from the appliance, flasked, packed and processed in clear acrylic.

The appliance, with stent attached, is then placed in the mouth and the nuts on the outside and inside of the long screw are adjusted until the desired position of the separated segments of the mandible is obtained. The splint may then be fixed in position by tightening the nuts or by cementing the acrylic portion to the teeth (Fig. 4).

If intermaxillary wiring has been used, the connecting wires should be removed after a week or two. There should be sufficient immobilization of the fractured mandibular parts to enable the patient to masticate a soft diet and in that manner restore the correct physiologic tone to the injured parts and not inhibit muscle function.

When the patient is considered ready

for the actual plastic reconstruction, the stent can be raised to permit a clear, unobstructed field for the bone graft and, when lowered, will assist in the creation of the mucobuccal fold. In addition, the stent will serve as a foundation for the healing of the soft tissues of the lower lip and chin.

We believe that this suggested appliance, when utilized in the particular case outlined, should be a useful adjunct in the preparation of the patient for plastic procedures necessary to rehabilitate those who have suffered defacing types of wounds.

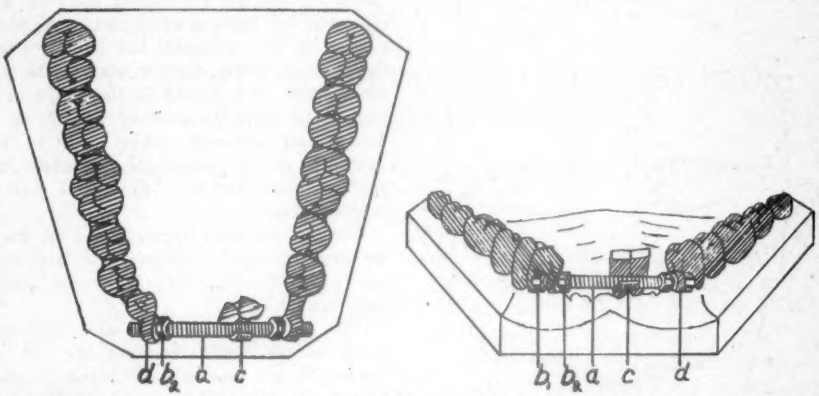

Fig. 6.—Occlusal and frontal views of appliance. The threaded horizontal bar (*a*) is fixed in position by the outer and inner nuts (b_1, b_2) placed on both sides of the eyelets (*d*). The continuous band embracing the two anterior teeth is anchored to the bar by means of the half cylindrical arm (*c*).

REPORT OF CASE

A soldier, aged 20, was wounded in action by fire from an enemy machine gun pistol. The 9 mm. bullet had penetrated the right side of the chin and shattered the right mandible along its inferior border, as well as loosening the lower bicuspids and cuspid teeth. It then traversed the soft tissues in the submental region, splitting the symphysis transversely and fracturing the right lower incisors and left cuspid. The bullet made its exit through the left side of the chin, fracturing the mandible on that side and causing a large gaping wound (Fig. 5). Another bullet penetrated the outer aspect of the right thigh and went out on the inner aspect, leaving a long wound which did not involve the femur or deeper structures.

A few hours later, he was treated at an evacuation hospital, where an emergency tracheotomy was performed. The facial wound was debrided and the chin sutured; the injury of the right thigh debrided, and the bilateral fracture of the mandible reduced and fixed by wiring and intermaxillary elastics.

The patient was then evacuated to a general hospital, where it was found necessary to further reduce the fractured parts. A lower labial arch was used and it was fixed to the continuous loop wiring of the upper jaw by means of intermaxillary elastics. This was accomplished approximately two days after injury.

On admission to hospital, five weeks later, it was found that the penetrating wound of the chin, extending from the left lower first molar area to the right lower first molar area, had almost completely healed. There were two fistulous tracts, at the inferior borders of the left and right mandible, which communicated with the sites of the shattered bony fragments. The tracheotomy wound had healed and the injury to the thigh was granulating. X-ray examination

revealed several sequestra lying in the fistulous tracts, more on the left side than on the right. The tracts were opened gently and a discharge of frank pus was obtained and several small spicules of bone were washed out. On changing the elastics, it was found that the individual sections of the mandible were freely movable. A large sequestrum was subsequently extruded from the fistulous tract on the left side. The occlusal planes of the teeth in the posterior segments were markedly tilted, to narrow the arch and decrease the vertical facial dimension. The anterior fragment was being drawn inward by muscle tension, which was becoming more pronounced. The overall picture was that of a collapse of the mandibular framework due to the bilateral destruction of bone. Six weeks had passed and there was ample evidence of nonunion of the fractured parts associated with a chronic bilateral osteomyelitic process that was being aggravated by the lack of fixation of the bony fragments. It was then decided to remove the labial arch in an attempt to provide rigid fixation and to correct the anatomic distortion. The posterior sections had to be moved in a lateral direction to restore the correct occlusal relationship. The anterior section had to be pulled forward and stabilized. The appliance to be described was designed by Dennis Glucksman in an effort to carry out the procedure outlined.

Fig. 7.—Appliance in position.

An impression of the lower teeth was taken and was poured in artificial stone. This model was duplicated in crystobalite. With 28-gage sheet wax, the three individual segments were waxed, the coronal portion of the teeth being covered and the interproximal areas reinforced. To receive the horizontal threaded bar, wax eyelets were added to the anterior porition, attached to the lingual aspects of the lateral segments. The attaching arms passed through the spaces created by the missing teeth on the right and left sides so as to permit the positioning of the horizontal bar labially from the two remaining anterior teeth. The anterior teeth were waxed in the shape of a continuous band terminating labially in a broad half cylinder, which was to be anchored to the horizontal bar after the anterior teeth had been moved to correct position (Fig. 6).

The cast was then fractured and the three separate segments were sprued, invested and cast in pure silver, to which coin metal had been added.

The appliance was then assembled and fitted to the teeth. Without the aid of cement, it was immediately found possible to separate the collapsing lateral segments gradually by adjusting the inner nuts. After this trial, the appliance was removed and the inner surfaces were swabbed with alcohol. The teeth were isolated with cotton rolls after a thorough pumicing and swabbed with alcohol, and the continuous band was cemented to the two anterior teeth. The threaded bar, with the two inner nuts attached, was passed through the eyelets of the lateral segments and the remainder of the framework cemented to position. After the cement had hardened completely, the inner nuts were tightened and the lateral segments of the mandible were gradually forced to correct positions. There was surprisingly little discomfort attending this procedure. The arm of the anterior section was then bent around the horizontal bar, immobilizing the segment (Fig. 7). The outside nuts were placed in position to minimize irritation at the corners of the mouth from the extra length of the threaded bar.

The following day, the patient was comfortable and no difficulty attended completion of the lateral movement to restore the correct anatomic dimensions of the mandible. Nuts, which had been imbedded in small balls of acrylic, were substituted for the outside nuts that were irritating the corners of the mouth. These served admirably for the three to four days during which the desired position of the fractured parts was obtained. The extra length of the horizontal bar was cut off, and, with an acrylic material used to reline artificial dentures without laboratory processing, small balls of acrylic were fashioned around the ends of the bar, presenting a smooth nonirritating surface.

At the present writing, the appliance has been in position for almost four weeks.

The previously movable parts are rigidly fixed in correct position. The right fistulous tract has closed and healing has apparently started. X-ray examination revealed a gradual obliteration of fracture lines accompanied by definite callus formation.

The patient is comfortable and can masticate a soft diet.

THE EFFECTS OF DIETARY DEFICIENCIES UPON THE ORAL STRUCTURES. II.

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Vitamin D Deficiency

Experimental.—Vitamin D is concerned primarily with calcium metabolism and the calcification of the hard tissues. Deficiencies in vitamin D are therefore reflected in a deficient calcification of the hard tissues—growing enamel, dentin and alveolar bone. The changes in the rat following a diet deficient in vitamin D, but high in calcium and low in phosphorus, were recently studied in detail by Weinmann and Schour (1945a-e) and Irving (1944).

Growing Dentin: The earliest effect of an acute deficiency in vitamin D is the appearance in the dentin of a line of disturbed calcification or calciotraumatic line (Weinmann and Schour, 1945a).

The response of the growing dentin to even a slight deficiency in vitamin D is so delicate that it can be used as an indicator of the adequacy of the vitamin D in the basal diet (Schour and Smith, 1934a). Calcification of the dentin occurs by the coalescence of individual small calcospherites, which begins at the predentin-dentin border. In even mild deficiencies, the coalescence of the calcospherites is incomplete so that instead of a homogeneously calcified dentin, interglobular dentin results. The dentin, which remains acidophilic, is dotted with the basophilic calcospherites instead of being homogeneously basophilic. The normally sharp demarcation between the predentin and the calcified dentin therefore also disappears.

In more severe chronic deficiencies of vitamin D, since the predentin does not become calcified at all, the dentin matrix continues to be deposited and the uncalcified predentin border becomes wider and wider until, in severe deficiencies, it may attain a width of 90 microns instead of the normal 10 to 20 microns (Karshan, 1933; Weinmann and Schour, 1945a). In severe, prolonged deficiencies, pulpal inclusions may be found in the newly formed dentin (Irving, 1941;

Becks and Ryder, 1931; Weinmann and Schour, 1945a). The rate of dentin formation is retarded (Weinmann and Schour, 1945a).

Pulp: Atrophy of the odontoblasts has been reported by Becks and Ryder (1931), but has not been confirmed. Blackberg and Berke (1932, 1937) observed inflammatory changes in the pulp. Secondary dentin is also retarded in the rate of formation and disturbed in calcification (Mellanby, 1930).

The effects of a vitamin D deficiency are aggravated by *(a)* a deficiency in calcium or phosphorus (Irving, 1944; Lund and Armstrong, 1942; Becks and Weber, 1931), *(b)* a disturbance in calcium-phosphorus ratio (Irving, 1944; Mellanby, 1929) and *(c)* a deficiency in vitamin A (Mellanby, 1929; Irving, 1943). In each instance, the primary effect on hypocalcification of the dentin is exaggerated.

Growing Enamel: Enamel formation and calcification are apparently unaffected by vitamin D deficiency. The enamel organ shows no changes during enamel formation. However, when the enamel organ reaches the stage when it is ready to atrophy, cystic degeneration may occur (Weinmann and Schour, 1945a). This effect is evident only after the enamel is completely formed and calcified (Weinmann and Schour, 1945a). Apparently, enamel hypoplasia results only when the vitamin D deficiency is made more severe by a direct or an indirect deficiency in calcium or by parathyroidectomy (Klein, 1931). Becks and Ryder (1931) did find enamel hypoplasia in rats subjected to vitamin D deficiency, but it is likely that this deficiency was made more severe in their animals by some unknown factor (Gaunt and Irving, 1940).

Alveolar Bone: The newly deposited layer of bone cannot calcify in vitamin D deficient animals, and so remains acidophilic. The normally thin osteoid border becomes very wide (Becks and Ryder, 1931; Weinmann and Schour, 1945b). This uncalcified osteoid tissue also resists resorption. (Weinmann and Schour, 1945c) explain the increased thickness of the rachitic bone on the basis of a generalized lack of resorption, not accepting the explanation suggested in the term "compensatory hyperplasia."

Periodontal Membrane: The periodontal space is narrowed and compressed by the continued growth of the osteoid border of the alveolar bone and its lack of resorption, and eventually undergoes hyaline degeneration. In the bifurcation of the rat molar, the periodontal membrane is crushed by the osteoid bone so that the latter is often in contact with the cementum (Becks and Ryder, 1931; Weinmann and Schour, 1945b).

Cementum: The formation of cementum matrix is normal, but since its calcification is defective, the uncalcified precementum border becomes very wide (Erdheim, 1914).

Eruption: Eruption of the teeth is retarded (Weinmann and Schour, 1945b; Hess, 1929).

Changes in Animals Other Than the Rat: Changes essentially similar to those observed in rats have also been found in the growing dentin of dogs (Mellanby, 1937; Blackberg and Berke, 1932) and guinea-pigs (Howe *et al.*, 1940). In puppies fed a diet deficient in vitamin D and rich in cereals, the secondary dentin normally formed in response to caries or attrition is either absent or reduced in amount and imperfectly calcified (Mellanby, 1930). Becks and Weber (1931) found osteoporosis and loss of supporting alveolar bone in dogs placed on a diet deficient in vitamin D. In dogs placed on a diet low in vitamin D and aggravated by low calcium and high phosphorus, they observed a replacement of bone by fibro-osteoid tissue and an obliteration of the lamina dura and the periodontal membrane.

Replacement Therapy in Rickets

Vitamin D: Irving (1941) and Weinmann and Schour (1945d) treated vitamin D deficient rats with vitamin D and observed an improvement in the calcification of the newly formed dentin. The predentin becomes narrowed and sprinkled with calcifying globules and the healing occurs first in the oldest layers of the predentin, next to the calcified dentin.

Phosphates: Administration of phosphate to vitamin D deficient rats results in a resumption of calcification in the oldest layers of the osteoid tissue at the end of the second day. Osteoclasts reappear and resorption of the newly calcified tissues occurs (Weinmann and Schour, 1945d). The dentin also shows improved calcification after phosphate therapy and a recovery to a normal rate of formation.

Starvation: Starvation of rachitic rats also produces a healing effect in the dentin (Weinmann and Schour, 1945d). The possible effects of spontaneous fasting of animals during short-term experiments must therefore be kept in mind in evaluating disturbances in calcification.

Vitamin D Deficiency in Man.—Growing Dentin: Typical rickets does not occur except in the young growing organism with a definite need for calcium for the calcification of its growing hard tissues. The histologic changes in human teeth, which are similar to those seen in experimental animals, consist of deficient calcification of the growing dentin (interglobular dentin and a wide predentin) (Gottlieb, 1920; Wolfe, 1935; Jump, 1939). A disturbance in the calcification of the dentin is not necessarily accompanied by a similar disturbance in the enamel (Jones *et al.*, 1933). This has already been pointed out in experimental vitamin D deficiencies (Weinmann and Schour, 1945a).

There is apparently a selective action of vitamin D in the calcification of the mesenchymal hard tissues (bone and dentin) since deficiencies in vitamin D do not usually affect the enamel.

Enamel Hypoplasia: Vitamin D deficiency is generally believed to cause enamel hypoplasia in man. A review of the experimental and clinical evidence does not allow an uncritical acceptance of this view. In sixty cases of enamel hypoplasia, only ten patients had a history of rickets (Sarnat and Schour, 1941, 1942). Friel (1922) reports an incidence of 28 per cent of enamel hypoplasia among Vienna children who suffered from a rachitogenic and otherwise deficient diet after the First World War. Infantile rickets does not always result in enamel hypoplasia, and it is very likely that, as is observed in experimental animals, enamel hypoplasia occurs when the vitamin D deficiency is aggravated by some other condition such as infantile tetany on a calcioprivic or parathyroprivic basis (Sjoquist, 1937).

Eruption: The eruption of the deciduous and permanent teeth is retarded (Friel, 1922; Speidel and Sterns, 1940).

Malocclusion: Malocclusion of rachitic origin has been reported. The imperfectly calcified alveolar bone is unable to withstand normal oral stress and therefore the teeth become malocluded.

Vitamin D Deficiency and Caries: A number of clinical investigations have been conducted on the effect of vitamin D on caries, with conflicting results. Mellanby and her co-workers have repeatedly suggested that optimal amounts of vitamin D will reduce the incidence of dental decay, although they were unable to produce dental caries in their experimental animals that were placed on a vitamin D deficient diet. McBeath and Verlin (1942) reported a lower incidence of decay in children receiving a daily addition of 800 units of vitamin D in their diet. These findings are not generally supported since many researchers found no effect on caries when supplements of either calcium or vitamin D

are added to the diet (Malan and Ockerse, 1941; Day and Sedwick, 1934). In spite of the increased intake of vitamin D in children during the last two decades, the incidence of decay has not shown any decrease (Brekhus). In addition, it must be emphasized that rickets is not necessarily accompanied by dental caries (Friel, 1922; Day, 1944). Youmans *et al.* (1944) observed no relation between extensive dental caries and calcium or vitamin D intake.

Hypervitaminosis D

A considerable literature has been developed on the deleterious dental effects of overdosage with vitamin D (Harris and Innes, 1931; Weinmann, 1933; Becks, 1942).

Growing Dentin: Harris and Innes (1931) report irregular calcification of the growing dentin in rats given excessive doses of vitamin D. A detailed histologic study of the effects of single massive doses of vitamin D showed, in the dentin, an immediate primary reaction in the form of a poorly calcified layer and a secondary reaction in the form of a well or excessively calcified layer.

Schour and Ham (1934) related the primary response to the rise in blood calcium and the secondary reaction to the return of the blood calcium to normal. Similar results were observed on administration of parathyroid hormone (Schour, Tweedy and McJunkin, 1934). No effect was observed in the growing enamel.

Massive doses of calciferol administered to parathyroidectomized rats resulted in improved calcification of the dentin similar to the effect of treatment with parathyroid extract (Schour, Tweedy, Chandler and Engel, 1937). While the influence of vitamin D and the parathyroid gland upon the calcification of the teeth can hardly be questioned, the mechanism of their action and their possible interrelationship present problems for future research.

Periodontal Structures: The alveolar bone becomes hypercalcified after massive doses of vitamin D; and since the cementum is hyperplastic as well as hypercalcified, a partial obliteration of the periodontal membrane results in the molar teeth (Harris and Innes, 1931; Weinmann, 1933; Fish and Harris, 1936).

In dogs, feeding of excessive amounts of vitamin D with optimum amounts of vitamin A results, according to Becks (1942) in (1) generalized osteosclerosis of the jaws and alveolar bone; (2) severe pathologic calcification in the periodontal membrane and gingivae; (3) excessive formation of an atypical cementum leading to ankylosis between tooth and bone; (4) development of multiple pulp stones, and (5) extensive formation of calcium. The addition of excessive amounts of vitamin A lessened the injurious effects.

The rate of dentin and bone apposition, as measured by vital staining with alizarin red S, was significantly increased after the daily administration of 78,000 U.S.P. units of vitamin D per kilogram to rats for a period of two weeks (Ziskin *et al.*, 1943).

Vitamin E Deficiency

Prolonged deficiency of vitamin E in the rat results in a loss in pigmentation of the enamel of the incisor. Davies and Moore (1941) explain this on the basis of a secondary deficiency of vitamin A, although whitening of the teeth has been observed in rats suffering from vitamin E deficiency, but that still had considerable vitamin A in reserve. Irving (1942) found in addition a premature and abnormal degeneration of the enamel organ which he regarded as being possibly specific for vitamin E deficiency.

It must be pointed out that premature atrophy of the enamel organ is common in many chronic disturbances.

Mineral Deficiencies

Total Salt Deficiency.—Rats placed on a diet low in all inorganic salts show severe disturbances in calcification of the growing teeth and of the bone (Arnim *et al.*, 1936; Anderson *et al.*, 1936).

The predentin becomes wider than normal and the amount of dentin formed is decreased until the incisors are mere shells, which fracture readily. In prolonged deficiency, dentin formation becomes irregular and vascular (pulpal) inclusions occur. In the molars, secondary dentin formation becomes irregular, and pathologic cuspal fractures occur, followed in turn by carious lesions, pulpal necrosis and periapical abscesses. Arnim *et al.* (1936) point out the fact that there is little effect on the enamel and that no enamel hypoplasia occurred in their animals.

The alveolar bone is more severely affected than is the dentin. The bony trabeculae of the supporting spongiosa disappear, being replaced with fatty marrow tissue until only a thin shell of bone is left to support the teeth.

Calcium and Phosphorus Deficiency.—Rats placed on a diet deficient in calcium and phosphorus show disturbances in calcification of the growing dentin and bone, with but little effect on the growing enamel (Gaunt and Irving, 1940).

Growing Dentin: Calcium and phosphorus deficiency results in a progressive increase in the width of the predentin, an irregular border between the predentin and dentin, interglobular dentin and, in severe chronic deficiencies, vascular inclusions (Gaunt, Irving and Thomson, 1939; Boyle and Wesson, 1943). The width of the predentin, normally 10 to 20 microns, may reach 90 to 100 microns, in direct ratio to the degree of deficiency, and is a much more sensitive measure of the deficiency than the chemical (ash) analysis affords (Gaunt, Irving and Thomson, 1938, 1939; Karshan and Rosebury, 1933) or the blood calcium analysis (Bevelander and Hoskins, 1939).

Growing Enamel: Gaunt and Irving (1940) found no changes in the enamel organ or in enamel formation or calcification. Boyle and Wesson (1943), employing a low phosphorus-calcium ratio of 16 to 1, observed premature atrophy of the enamel organ and, in severe chronic cases, disturbed calcification and hypoplasia. Supplements of vitamin D prevented these effects (Wesson and Boyle, 1943; Boyle and Wesson, 1943). Thus, it is clear that, in calcium and phosphorus deficiency, as in vitamin D deficiency, the growing enamel is much less liable to disturbances in calcification than are the growing dentin and bone.

Alveolar Bone: The alveolar bone tends to show excessive resorption (Becks and Simmonds, 1935; Becks and Weber, 1931). This is in contrast to vitamin D deficiency, in which resorptive activity is decreased because of the osteoid border (Weinmann and Schour, 1945b). In calcium and phosphorus deficiencies, the effect on the bone is seen before the effects can be noted in the dentin (Arnim *et al.*, 1936; Gaunt, Irving and Thomson, 1939).

Alterations in Calcium-Phosphorus Ratio: For the normal calcification of dentin and bone, the calcium-phosphorus ratio must be between 4 and 5 and the amount of these elements in the diet must be at least 0.3 per cent (Gaunt and Irving, 1940). If the calcium and phosphorus content of the diet is less than 0.3 per cent, rickets results. The effect of a deficient intake is made more severe by changing the calcium-phosphorus ratio. Downs (1932) observed disturbances in calcification when the calcium-phosphorus ratio was either abnormally high or abnormally low. Gaunt and Irving (1940) showed that when the calcium-phosphorus ratio is lowered from 4 to 1 or 0.5, the effects upon the dentin are much more severe than upon

the bone. Vascular inclusions are common and the ash content of the bone is much less affected. On the other hand, when the calcium-phosphorus ratio is high, but both calcium and phosphorus are deficient in amount, the effects on the bone are more severe than on the growing dentin (Gaunt and Irving, 1940).

Vitamin D Therapy in Calcium Deficiency: Vitamin D therapy greatly lessens the effects of a diet deficient in calcium (Boyle and Wesson, 1943; Wesson and Boyle, 1943). Boyle and Wesson suggest, but do not prove, that the action of vitamin D in improving the calcification of tissues in animals on a low calcium diet is due to increased retention of calcium. They also show that a high protein diet limits the effectiveness of the vitamin D.

In rats on a calcium-phosphorus deficient diet, Irving (1944) observed a resumption of calcification in the newly formed dentin thirty hours after the administration of 18.4 international units of vitamin D. The amount of vitamin D necessary for the resumption of calcification varied with the calcium-phosphorus ratio of the diet.

Multiple Deficiencies in Vitamin D and Calcium: Vitamin D deficiency greatly aggravates the effects of a calcium-deficient diet (Mellanby, 1929; Irving, 1944). Lund and Armstrong (1942) fed rats a diet low in calcium and essentially vitamin D free. They observed, on gross dissection, that the alveolar bone was soft and friable and the molars were loose. The incisors were well developed. Becks and Weber (1931) observed marked resorption and osteoporosis in the jaws of pups fed a diet deficient in vitamin D and low in calcium, but high in phosphorus. The supporting bone was entirely replaced by fatty marrow. Toverud and Toverud (1931) fed pups a diet deficient in calcium, phosphorus and vitamins A and D and found that the age of the animal and the duration of the experiment affects the severity of the results. The disturbances in the calcification of the teeth were increasingly severe if the experimental diet began at the end of lactation, at birth or during gestation.

Parathyroidectomy also alters the effects of a diet low in calcium (Bevelander and Hoskins, 1939) and makes them more severe.

Difference in Effect of Calcium Deficiency on Dentin and Bone: The effect of a calcium-deficient diet is much less severe in growing dentin than in bone (Gaunt, Irving and Thomson, 1939). Dentin has a distinct priority as regards the available calcium since, in mild deficiencies, dentin calcification may be normal, while bone calcification is deficient (Karshan, 1933). Erdheim (1914) points out that certain tissues are less susceptible to disturbances in calcium metabolism than are others. His calcioprotective law has been proved many times (Arnim *et al.*, 1936; Gaunt, Irving and Thomson, 1938; Clarke and Smith, 1930; Schour, Tweedy and McJunkin, 1934). In addition, while bone may show marked resorption and replacement by fatty marrow, the dentin does not. Dentin is not subject to calcium withdrawal by resorption as is bone In fact, the calcium and phosphorus made available by the bone are avidly taken up by the calcifying enamel and dentin (Schour, 1938a).

Adult Teeth: Efforts to alter the calcium content of the adult dentin in dogs by large doses of vitamin D and calcium over periods up to 135 days have been unsuccessful in spite of the fact that the calcium content of the blood was almost double the normal (Fish, 1935).

The molars of rats placed on a diet deficient in calcium show that the preexperimental dentin is unaffected, but the secondary dentin, forming during the experimental period, is poorly formed and calcified (Boyle and Wesson, 1943).

Calcium Deficiency in Man: Calcium

is an important dietary consideration and deficiency in calcium intake is common in man (Gaunt, Irving and Thomson, 1938, 1939; Youmans *et al.*, 1944). The changes in growing dentin and bone are similar to those observed in experimental animals (Massler, Schour and Poncher, 1941; Eliot and Parks, 1943). The fully formed enamel and dentin are not affected by calcium deficiency or by any calcioprivic state (Schour, 1938a).

Roentgenograms of the growing epiphyses reveal deficiencies in calcium and vitamin D in the growing child. This method of assessment is not applicable in the adult (Youmans, 1944). Since the alveolar bone continues to grow throughout life and is composed, like the trabeculae under the epiphyseal plate, of spongy bone, dietary deficiencies related to mineral metabolism affect this bone quickly. On the basis of work now being conducted, we believe that intraoral dental roentgenograms of the alveolar bone may show the effects of calcium and vitamin D deficiencies in the adult.

Calcium and Caries: There is no established relationship between calcium therapy or calcium intake and caries (Dean, 1943; Malan and Ockerse, 1941). Day (1944) found that rachitic children and women suffering from osteomalacia in Northern India were remarkably free from caries. Malan and Ockerse (1941) studied a group of children who were fed daily supplements of calcium and phosphorus (0.5 gm. each) and found no significant effect on the incidence of caries. Rats on low-calcium diets do not show any increase in caries (Boyle and Wesson, 1943). Day and Sedwick (1934) found that supplements of vitamin D had no significant effect on the incidence of caries. Biochemical studies have shown that caries is not dependent on the calcium content of the enamel or dentin (Armstrong and Brekhus, 1937).

Iron Deficiency: The oral manifestations of iron deficiency, which have been given much less consideration than those of calcium deficiency, merit investigation.

Magnesium Deficiency: Rats placed on a diet deficient in magnesium show characteristic disturbances in both the calcification and the formation of the incisors. Roentgenographic findings consist of widening of the periodontal membrane, the presence of an indistinct lamina dura and a disturbance in contour of the enamel surface (Gagnon, 1940). Eruption is retarded to one-third the normal rate (Gagnon, Schour and Patras, 1942; Duckworth and Godden, 1940). Chemical studies show no change in the absolute amount of magnesium in the incisors, in contrast to the decrease in the long bones (Duckworth and Godden, 1940).

Calcification of Dentin: Disturbances in the calcification of the dentin are characterized by a prominent stratification which is unlike that seen in any other known experimental condition. The striations are sharply delineated and are repeated at intervals of 32-48 microns (Irving, 1940). It has been assumed that these striations are associated with the intermittent interference with calcification and the convulsive attacks of magnesium deficiency (Gagnon *et al.*, 1942). However, Watchorn and McCance (1937) also found these striations in subacute magnesium deficiency in which no convulsions occurred.

Formation of Dentin: The rate of dentin apposition is progressively decelerated, the enamel-covered dentin apposition being retarded almost immediately and more severely than that of the cementum-covered portion.

The width of the labial and the lingual dentin is approximately the same in the normal animal. In magnesium deficiency, the labial width is one-third or one-half that of the lingual width. The pulpal outline, therefore, is characteristically distorted. This finding is in

direct contrast to that in vitamin A deficiency, in which the rate of formation of the enamel-covered dentin is accelerated and that of the cementum-covered dentin is decelerated.

Temporary local cessation of dentin growth may occur, resulting in pulpal inclusions. The rate of formation is also decreased in the growing dentin of the molars. The retardation of the rate of dentin apposition and tooth eruption is greater than that of body weight.

Pulp: The odontoblasts show an early and progressive atrophy. They are reduced in size and become enclosed and calcified within the dentin matrix (Watchorn and McCance, 1937). The pulp shows various types of calcification (Becks and Furuta, 1942).

Growing Enamel: The enamel epithelium undergoes early atrophy and degeneration and, in advanced stages of the deficiency, the enamel is severely hypoplastic (Becks and Furuta, 1939). Irving (1940) describes calcareous granules which become embedded in the enamel matrix at the basal end.

Periodontal Structures: Klein, Orent and McCollum (1935) reported a gross proliferation of the periodontal structures in rats. The gingivae were hypertrophied and the periodontal membrane showed edematous changes in the intercellular structure and an increased width. The growth of the alveolar bone is decelerated to one-half or less of the normal rate (Gagnon *et al.*, 1942).

During the deficiency, replacement therapy does not change the structures already formed, but leads to recovery of the odontoblasts and to normal eruption.

Fluorosis

Experimental.—Although fluorosis does not constitute a dietary deficiency, the presence of fluorides in the drinking water (and to a much lesser extent, in food) of many communities and its effects on tooth development call for its consideration in this review. There is no evidence that fluorine is essential to the body economy or to tooth development. In fact, fluorine is an enzymatic inhibitor and a protoplasmic poison. Ingestion of fluorides in excess amounts has a harmful effect in contrast to that of most nutritional factors, which affects the teeth and periodontal structure when they are deficient in amount.

Fluorosis has been the subject of comprehensive reviews (Moulton, 1942; Roholm, 1937; Greenwood, 1940).

Growing Enamel: The developing enamel is the first structure to react to the ingestion or injection of fluorides. The ameloblasts show a selective response in the form of abnormal globules within their cytoplasm as early as one hour after a single injection of 0.3 cc. of a 2.5 per cent solution of sodium fluoride (Schour and Smith, 1934b). This is followed by the formation of sharp rings indicating disturbed calcification of the enamel and dentin. The disturbance in calcification is probably brought about by the deposition of calcium fluoride in the tissue instead of the usual calcium salts, and possibly also by disturbance of the enzymatic phosphatase system concerned in calcification (DeEds, 1941). Irving (1943) suggests that fluorine acts primarily on the composition of the blood.

The demarcation of the growing enamel and dentin by injections of sodium fluoride permits an exact quantitative measurement of the rate of growth of enamel and dentin in animals and man (Schour and Smith, 1934; Schour and Poncher, 1937; Irving, 1944).

Feeding of sodium fluoride to rats results in different degrees of disturbance in calcification of the enamel, depending on the dosage and duration of the experiment. The effects range from mild disturbances such as the loss of pigmentation and defective calcification in the enamel to severe enamel hypoplasia (Schour and Smith, 1942).

In man, the ingestion of water con-

taining more than 5 parts per million of fluoride during a protracted period of enamel (crown) formation and calcification results in a characteristic mottling of the enamel in 90 per cent of children. In 35 per cent, the enamel may be subject to hypoplasia and is permeable by oral stains, often appearing brown. The ingestion of water containing about 2 parts per million of fluoride results in mild mottling in approximately 50 per cent of children. The ingestion of water containing 1 part per million of fluoride results in a mild mottling of the enamel (chalky white spots) in about 10 per cent of exposed persons (Dean, 1936, 1942).

Biochemical analysis shows that the fluorides ingested during the period of development are stored in the hard tissues throughout life (Armstrong, 1942).

Growing Dentin: The growing and calcifying dentin responds much less to the presence of fluoride than does the developing enamel. The calcification of the dentin becomes interglobular and stratified only after relatively large doses. Disturbances in the formation of the dentin matrix (vascular and pulpal inclusions) occur only in prolonged experiments and are probably the cumulative toxic effect of ingestion of fluorides (Schour and Smith, 1934a, 1942). Calcium has a protective action against fluorine intoxication, and variations in the calcium and phosphorus content of the diet may modify the degree of response of the dentin (Irving, 1943), but fail to nullify the effect of the fluorine (Smith, 1936). Fluorides, when added to the diet, are most toxic in water, less in milk and least in mixed foods (Hoffman, Schuck and Furuta, 1942).

Periodontal Structures: The periodontal structures show the least disturbance. In dogs, prolonged feeding of fluorides produces changes that can be recognized roentgenographically and that consist of an irregular and indistinct outline of the periodontal membrane and the alveolar bone trabeculae (Roholm, 1937).

Adult Teeth: Completely formed and calcified enamel and dentin are not affected by fluorides. The teeth of an individual who has lived many years in an endemic area in which there is sufficient fluorine in the water supply (usually more than 1 part per million) to produce mottling of the teeth in children shows no effects provided he settled there after tooth development was complete (McKay, 1942).

Fluorides and Caries.—Recent experimental, biochemical, clinical and bacteriologic investigations show that mottled enamel is less susceptible to dental caries than nonmottled teeth (Dean, 1944; Armstrong, 1942). Addition of fluorides to the diet inhibits experimental caries in the rat (Miller, 1938; Finn and Hodge, 1941). Doses up to 10 parts per million must be used to be effective (McClure, 1941a). Miller (1938) explains the action of fluorides as an inhibition of the phosphorylation mechanism in the carbohydrate breakdown by the bacteria. Another possible explanation is that an optimal amount of fluoride in the enamel makes it more resistant to acid dissolution (Armstrong, 1942a).

It has been estimated that, in man, the daily ingestion of 0.5 to 1.0 mg. of fluoride during the first eight years of life would reduce caries about 50 per cent (McClure, 1943a; Dean, 1942). This fact has led to many investigations attempting to utilize fluorides to prevent or lower the incidence of dental decay by topical application (Knutson and Armstrong, 1944) or by adding fluorides to the communal water supply in minute quantities (1 part per million or less) (Dean, 1944).

The dangers of chronic fluorosis call for caution and further investigation before fluoride is added to water supplies generally (Dean, 1944).

(End of Part II)

FURTHER TESTIMONY IN HEARINGS ON NAVAL DENTAL BILL

STATEMENT OF VICE ADMIRAL ROSS T. McINTIRE, CHIEF, BUREAU OF MEDICINE AND SURGERY

Admiral McINTIRE. Mr. Chairman, I have gone over the proposed substitute bill, and in the short time at our disposal we have tried to work out ways and means whereby that could be operated under the Chief of the Bureau of Medicine and Surgery.

We came to the conclusion that we could not work out a satisfactory set-up, from our standpoint, whereby we could come back to this committee at this time agreeing to all of the sections in the substitute bill. My main objection is the administrative set-up in the field. When I say in the field I mean on board our combatant ships. Admiral Jacobs is in complete agreement with me on this, that as to anything we do with vessels, our administrative set-up on our combatant ships at this time will be bad. We have gone ahead in that matter to do what we could do in changing our administrative set-up there and give the Dental Division more autonomy and more freedom of action, and think that we have gone as far as we could possibly go at this time and be assured that we can still operate a smooth-running organization.

Mr. RIVERS. But it is not running smoothly.

Admiral McINTIRE. I am sorry, but at this time I may say the results speak for themselves, and when I show you the results coming in from the field from our combat areas, I would say that you have a record that no one could say is not an efficient one.

Mr. BATES. Do I understand that the admiral wants more time to give further thought to this question?

The CHAIRMAN. Admiral, have you some proposal to submit to the committee from your point of view, now?

Admiral McINTIRE. I have worked out and have here what I believe will be a very excellent substitute for the time being. It will take a long time. Sixty days is a very short time to reorganize the Department in peacetime, which would not be so bad, but in time of war it is a different matter.

The CHAIRMAN. What is your proposal?

Admiral McINTIRE. I have a proposal here that I believe would work out very well from the standpoint of the Dental Division in the Bureau itself. I propose a substitute here, which, regardless of what is done here, is not entirely satisfactory to them. They make a very clear statement about it and I will be frank with what they say; they do not believe this will be satisfactory to the people in the field, because they still wish to operate independently of the Medical Department; but from my standpoint, this is a very fair thing at this time. This is what I propose.

Mr. MOTT. May I interrupt to ask if what you are proposing is an amendment to the draft which the committee has, or whether it is a new proposal?

Admiral McINTIRE. It is a new proposal in lieu of the substitute.

Mr. MOTT. Do you have any prints of the draft that is proposed?

The CHAIRMAN. Not of this proposal because this is submitted for the first time.

Mr. MOTT. I mean of the bill.

The CHAIRMAN. Yes.

Will you read your proposal, Admiral, if you please, sir.

Admiral McINTIRE. This is what I propose:

DENTAL BILL—ADMIRAL McINTIRE'S DRAFT

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That within sixty days after the date of enactment of this Act the Bureau of Medicine and Surgery shall be reorganized so as to provide for greater integrity of the dental service in accordance with the provisions hereof.

SEC. 2. The dental functions of such Bureau shall be defined and prescribed by appropriate directives of such Bureau and any necessary regulations of the Secretary of the Navy to the end that the dental division of such Bureau shall study, plan and direct all matters coming within the cognizance of such Division, as hereinafter prescribed, and all matters relating to dentistry shall be referred to the Dental Division.

SEC. 3. (a) The Dental Division shall (1) establish professional standards and policies for dental practice; (2) conduct inspections and surveys for maintenance of such standards; (3) initiate and recommend action pertaining to complements, appointments, advancement, training, assignment, and transfer of dental personnel; and (4) serve as the advisory agency for the Bureau of Medicine and Surgery on all matters relating directly to dentistry.

(b) The Dental Division shall consist of (1) an office of the Chief of Division, (2) a Dental Standards Branch, (3) a Dental Personnel Branch, and (4) a Dental Liaison Branch. An officer of the Dental Corps of the Navy shall be detailed as the Chief of the Dental Division. Such officer, while so serving in time of war shall have the rank, pay, and allowances of a rear admiral.

SEC. 4. On shore stations and on ships, all dental services, and dental officers with respect to dental services, shall be under the senior dental officer: *Provided,* That this section shall not be construed to impose any administrative requirements which would interfere with the proper functioning of battle organizations.

The CHAIRMAN. Members of the committee, that is what Admiral McIntire has worked out, giving recognition along the lines suggested about the Dental Corps, to be substituted in lieu of what is being submitted, and if anyone wants to offer any amendment on the floor of the House, of course, he has a perfect right to do so.

Mr. MOTT. That is pretty quick action.

Mr. RIVERS. Mr. Chairman, I have had no opportunity to talk with the admiral about that. At your direction, the Bureau of Medicine and Surgery was to try to work out something that would be satisfactory to the dentists, and that has never been done.

I will say we have collaborated in drawing this amendment with the American Dental Association, and this amendment which the Judge Advocate General drew would not do anything to improve the service. The American Dental Association does not agree with that report, and I will move that the amendment that you substituted, and which I accepted, be adopted in lieu of the one reported on.

The CHAIRMAN. I offer as a substitute to strike out all after the enacting clause and substitute what the admiral has read.

Mr. MOTT. May I offer this comment? How, in the matter of ten or fifteen minutes, can this committee act intelligently and decide whether the bill before us is a better one than the suggestion which the admiral has made? I do not want to vote on it on such short notice and without a further explanation.

The CHAIRMAN. I will admit that this is not as intelligent an approach to it as we might otherwise make, but I do not want to get in the position of trying to keep this committee from acting on this matter.

At the instance of Mr. Rivers and on behalf of the committee, I wrote a letter to Admiral McIntire the other day and told him that we wanted a decision from him on Thursday—that is today—and to be here with some proposal. The admiral is here and he has made his proposal. You can do what you want to do with it, because I want the committee to pass on it.

Mr. MOTT. How can you possibly vote on a matter as important as this without having an opportunity to examine the admiral?

The CHAIRMAN. If you ask for a hearing on it then it is going to be said that we are procrastinating and killing time.

Mr. MAAS. We could not possibly pass it before the recess. We ought to know what it is all about.

Mr. BRADLEY. Is this print before us the proposed amendment suggested by Mr. Rivers?

The CHAIRMAN. That is the one I offered the other day as a basis for some kind of a compromise.

Admiral MCINTIRE. This is supposed to be a compromise.

Mr. Rivers. What happened to the bill which changed the name from the Bureau of Medicine and Surgery?

The CHAIRMAN. I am offering this morning what Admiral McIntire has offered as a solution of the matter. If anybody wants to adopt it, that is all right with me, but if you do not want to adopt it, that is all right.

Mr. BRADLEY. Would it not be better to defer action until we can analyze the Admiral's bill?

The CHAIRMAN. I think it might be better to defer it, but Mr. Rivers wants a vote and other members want a vote.

I am not going to be placed in the position where it can be said that I am not trying to get a vote.

Mr. MOTT. I want to ask where is the bill that the Judge Advocate General drafted? That bill provided for the Bureau of Medicine and Surgery——

The CHAIRMAN. I want to say this. It seems to me that the sensible thing to do is to work something out after intelligent consideration, but if you do not want to do it that way, then it is for you to go ahead and do what you please. But that is the worst way to do it, and you may not accomplish the thing we are trying to do. We are trying to work it out, and the admiral has tried to work it out, and he has brought us something which he has offered to the committee. As one member of the committee, I am going to stand with the admiral on his position, although it may not be a sound position. I would say we ought to have a hearing on it, but Mr. Rivers does not want a hearing. He said he wants a vote.

Mr. COLE. I want to offer a substitute, in connection with the committee print, which might go alongside of the suggestion made by the admiral.

I will offer a motion to substitute, in line 3, page 1, of the committee print, or to strike out the words "within sixty days," and insert the words "as soon as practicable." The admiral, as I understand it, has indicated that sixty days might be restrictive.

The CHAIRMAN. It might not be practicable for a long time, but that is all right with me.

Mr. RIVERS. Let us say six months.

The CHAIRMAN. "As soon as practicable" would be all right.

Mr. MOTT. "As soon as practicable" is entirely indefinite.

Mr. RIVERS. Let us say six months, but do not let us cut the heart out of the bill.

Mr. MOTT. If we should report this bill with that amendment in it, providing that within six months you should reorganize the dental department along the lines of this bill—

The CHAIRMAN. It would mean that the admiral, in whatever period of time was provided, would have to reorganize that department in accordance with the provisions of the bill, which, as I understand it, the admiral said he cannot do under that condition.

Mr. MOTT. The Admiral did not say that.

Admiral MCINTIRE. I did not say we could not do it. I said you are going to give us a very difficult job.

Mr. MOTT. As I understood you, you said sixty days would be a short time in peacetime?

Admiral MCINTIRE. Yes.

The CHAIRMAN. If this was made six months, could you make the reorganization without too much interference?

Admiral MCINTIRE. There will be plenty of interference; but I want to say this to the committee so that you will understand what you are going to do, if you decide to vote this out. You will duplicate the complete set-up in the medical department, as you will have one set-up in the medical department and you will have a dental department with the identical set-up. I want you to realize what this means.

Mr. MOTT. How did you and Admiral Gatch come to the conclusion a few weeks ago that the bill that was drafted as a substitute for Mr. River's original bill was a good thing?

Admiral MCINTIRE. That was not this. Section 4 of this substitute measure does the damage, as far as I am concerned.

Mr. COLE. I hope that can be corrected. What have you to say about my proposed amendment affecting the time?

Admiral MCINTIRE. I am sorry; I have no objection to the time limit.

The CHAIRMAN. Why can we not have printed what the admiral proposes and then be back here at 9 o'clock tomorrow morning to see what his proposition is?

Mr. ANDERSON. I would say a month, Mr. Chairman.

Mr. MOTT. How can we consider the bill between now and 9 o'clock tomorrow morning if the bill is not printed by that time?

The CHAIRMAN. We will have it typed and send it around to each member today so it can be studied before tomorrow.

We will take a recess now.

Mr. RIVERS. I think we should face the issue right now.

Mr. BATES. I raise the point of order, Mr. Chairman, that the House is in session.

The CHAIRMAN. We are going to adjourn now.

Mr. BATES. I make the point of order and insist upon it, Mr. Chairman.

The CHAIRMAN. We will take a recess now until tomorrow morning at 9 o'clock on this dental bill. We will try to dispose of it at that time.

(Thereupon, the committee took a recess until tomorrow, Friday, June 23, 1944, at 9 a.m.)

HOUSE OF REPRESENTATIVES,
COMMITTEE ON NAVAL AFFAIRS,
Friday, June 23, 1944.

The committee met at 9 a.m., Hon. Carl Vinson (chairman) presiding.

The CHAIRMAN. The committee will be in order. We will hear Admiral McIntire.

STATEMENT OF REAR ADMIRAL ROSS T. MCINTIRE, SURGEON GENERAL, UNITED STATES NAVY

The CHAIRMAN. Admiral, have you any additional statement you desire to submit to the committee with reference to the dental bill?

Admiral MCINTIRE. Mr. Chairman, I shall be exceedingly brief. I have tried, in the number of hours that I have been here before this committee on this bill, to give the committee my opinion as to the administrative difficulties that will be raised by the passage of this bill. I think I have given you a fairly clear idea of how I feel about it.

There is one thing that disturbs me, and I want to bring it out once more. I think I should. I do not believe serious consideration has been given to the enlisted man and what happens to him when you set up this sort of a proposition, because you are setting aside Hospital Corps men into a narrow field and I have yet to find a way to show these men where they can go in the line of promotion.

I have the greatest respect for the enlisted man in the Hospital Corps. He is doing a part in this war that could not be filled by any other group. And so, when we do these things, I think we must give very serious thought as to what happens to him.

The CHAIRMAN. Then the Hospital Corps man will be in a class all by himself?

Admiral MCINTIRE. He may need to be, because this is a specialist's game.

Mr. RIVERS. We are going to take care of him in another bill; are we not?

Admiral MCINTIRE. That is something that is going to be very difficult to work out, because we must find some way, when a man goes into the dental side, of showing him how he can go up the line to warrant and then on to commissioned rank. He must have the same chance as any other boy who comes out of high school and goes into the Hospital Corps.

Mr. HÉBERT. Are we not now taking the backlog of the Hospital Corps who were originally medical school candidates and who failed to get into the A, B and C categories, when we select them for further study, and then they pick the Hospital Corps? You are taking them as fast as possible out of the Hospital Corps and putting them in medical schools if they qualify; is not that correct?

Admiral MCINTIRE. Some of those men are going in, that is true.

Mr. HÉBERT. Will they not be in the same position as the boy who wanted to study dentistry? Could he not be placed in a dental school?

Admiral MCINTIRE. Yes; if we had men who were qualified for it. That is true; but that would not give you the men you need. You want continuing men. Hospital Corps men, to be valuable to the Medical Corps as well as to the Dental Corps and the other specialties, where we have channeled them into finance and matériel—those men need to go on and make a career out of it. One of the difficulties now is with those who only stay three or four years.

Mr. HÉBERT. A man in the Hospital Corps who elected to go into the dentistry side, would he not know of the limitations before he elected that?

Admiral MCINTIRE. He should. Our difficulty now is that we have had to assign Hospital Corps men to the Dental Division, because we have not had enough volunteers to fill in.

Mr. HÉBERT. Could not that situation be taken care of in this manner: If you, of necessity, must assign men to the Dental Division of the Hospital Corps, they be given a preference to return to the medical side whenever there is a vacancy?

Admiral MCINTIRE. That does not help dentistry at all. I am just as interested in seeing that the Dental Corps functions efficiently as I am interested in seeing that the Medical Corps functions efficiently. There is a great difference in the responsibility of the medical officer on board a ship and the dental officer; but, just the same, I must see that the dental officer has everything necessary to make him function efficiently.

Mr. HÉBERT. I appreciate that.

Admiral MCINTIRE. When we rotate corps men through the dental section, we do not keep the men there as long as we should, because these boys believe that they can do much more if they get into a wider field.

Mr. HÉBERT. I read a copy of your draft of the bill and I read yesterday a copy of the third or fourth draft of Mr. Rivers' bill. I really could not see much difference between the two bills, so far as accomplishing the purposes that the dentists want to accomplish. Frankly, I thought, from a reading of your bill, that it accomplished exactly what the dentists wanted.

Admiral MCINTIRE. It does not.

Mr. HÉBERT. I think the committee would like to know the difference between the two bills.

Mr. RIVERS. We have Dr. Mead here, who can tell us.

Mr. HÉBERT. I am asking the Admiral now. We can hear Dr. Mead later, if we wish.

Admiral MCINTIRE. I think I am competent to tell you what happens in the Navy.

The CHAIRMAN. That is right.

Admiral MCINTIRE. The principal difference between the two is simply this. What I have suggested—and I feel it is as far as I can go at this time and prevent confusion—is to leave out the section that may be interpreted to require us in effect to set up on board ship two separate departments. That is, if we set up, on board ship, a dental officer who is only responsible to the commanding officer, you set him aside from the medical department; and since we have a very close working organization on every ship in the Navy today, and a very close working of the dental officers and their corps men with the medical officers and their corps men——

Mr. RIVERS. How is that going to affect it?

Admiral MCINTIRE. It will cause this. You are setting aside integration of the medical department. Mr. Izac and I talked about that once before. Theoretically we should be able to say, "All right; you are all working together just the same in one organization," but the dental officer is not going to be satisfied.

Mr. IZAC. Of course, Doctor, if you had a commander in the Dental Corps and only a lieutenant in the Medical Corps and you were trying to merge them into this organization, they would not fit so well. Whether you would ever have that sort of a situation remains to be seen; but, apparently, you are talking of a case where you have, we will say, a three-striper, a doctor, and a dentist who is maybe a two-striper, and he becomes part of the medical organization. I can see how you would not separate those two. They would form one homogeneous group for the purpose of evacuating wounded, and so forth. But for disciplinary reasons, would there be any objection to having this separate, and then the other separate—the medical and the dental sides?

Admiral MCINTIRE. Not particularly for disciplinary reasons, but again, the next thing that comes up is the question of your enlisted man.

Mr. BRADLEY. Is there an effort made generally to have a medical officer at least of equal rank with the dental officer? I am speaking of the senior medical officer.

Admiral MCINTIRE. I would say that out of every 100 ships you would not find over one at this time that would have the senior medical officer junior to the dental officer. I can think of only one ship of the larger ships that has that situation at this time. We try not to do that because of the problem that Mr. Izac mentioned; it is human nature all over again.

Mr. BRADLEY. Would you ever run into a situation on the smaller ships or at isolated stations—I know that it would not occur very often—where a dental officer might be subordinate to a warrant pharmacist?

Admiral MCINTIRE. No; that would never happen.

The CHAIRMAN. Members of the committee, time is very short. We have a quorum present. The admiral has pointed out repeatedly the Navy Department's objection to the bill and he is leaving it entirely to the committee to exercise its own discretion and do with it what it pleases. Is that correct, Admiral?

Admiral MCINTIRE. As far as I am concerned; yes. I think I have brought out everything that I can think of. I think it is the responsibility of the committee to act as it sees best.

Thank you very much.

The CHAIRMAN. I move to strike out all after the enacting clause and insert the amendment that was read yesterday.

Mr. COLE. As a substitute, Mr. Chairman, I would like to move to make several amendments. First, on page 1, line 3, of the committee print——

Mr. IZAC. The first vote would have to come on the substitute, would it not?

Mr. COLE. No. The chairman's motion is not a substitute. His is a motion to strike out all after the enacting clause and insert an amendment.

The CHAIRMAN. Very well. Let us first consider the bill open for amendments.

Mr. COLE. On line 3, I move to strike out "within 60 days" and insert "as soon as practicable."

Mr. RIVERS. Mr. Chairman, as a substitute to that, I move to strike out "60 days" and insert in lieu thereof "6 months."

The CHAIRMAN. The question is on Mr. Rivers' amendment to Mr. Cole's motion.

(Mr. Rivers' motion was agreed to.)

Mr. COLE. Mr. Chairman, on page 2, line 7, I move that after the word "allowances" there be inserted a period and the remainder of the sentence stricken out; and on line 7, before the word "rank," insert the word "same," so that the sentence will read, "such officers while so serving shall have the same rank, pay and allowances." In other words, the head of the Medical Corps and the head of the Dental Corps, while they are serving, will be of equal rank and of equal pay.

Mr. IZAC. I am afraid that the effect of Mr. Cole's amendment would be to reduce the rank of the medical officer, perhaps, down to captain.

Mr. COLE. Not necessarily. It just means that whoever are in those two offices will have the same rank, whether it is in wartime or in peacetime.

The CHAIRMAN. The question is on Mr. Cole's motion.

(The motion was not agreed to.)

Mr. COLE. On line 11, strike out the words "on ships and" and, in line 14, strike out the words "such ship or."

The CHAIRMAN. That means it would not apply on ships?

Mr. COLE. It would apply on ships except for giving to the dental officer complete jurisdiction over everything pertaining to dentistry. In that case, it would only apply to shore stations. That, I understand, would remove the basis of the main objection of the admiral.

Mr. RIVERS. All that does is to cut the heart out of the bill.

The CHAIRMAN. Read it again.

Mr. COLE. On line 11, strike out the words "on ships and" and, in line 14, strike out the words "such ship or"

The CHAIRMAN. All in favor——

Mr. BATES. Let us have just a little definition of what you mean.

The CHAIRMAN. That is the objection that Admiral Jacobs pointed out a moment ago, which was one of the serious objections about the whole thing.

Mr. BATES. If the dental officer is not responsible to the commanding officer of the shore station, who is he responsible to under this bill, without your change?

Mr. RIVERS. You mean the present bill?

Mr. BATES. The present bill; yes.

Mr. RIVERS. He is responsible to the commanding officer, and we want it to remain that way.

The CHAIRMAN. Now, all in favor of Mr. Cole's amendment hold up your hands.

(The Chairman announced the amendment was not agreed to.)

Mr. COLE. I ask you to call the roll.

(Captain Bogart called the roll and announced there were ten ayes and 14 noes.)

The CHAIRMAN. The motion to adopt Mr. Cole's amendment is lost. I offer now the substitute—to strike out all after the enacting clause and substitute the proposal submitted to the committee yesterday by the Navy Department.

Mr. COLE. May we have it read, so as to make sure what it is?

The CHAIRMAN. Read it, Commander.

Lt. Cmdr. CALHOUN (reading):

That within sixty days after the date of enactment of this Act the Bureau of Medicine and Surgery shall be reorganized so as to provide for greater integrity of the dental service in accordance with the provisions hereof.

SEC. 2. The dental functions of such Bureau shall be defined and prescribed by appropriate directives of such Bureau and any necessary regulations of the Secretary of the Navy to the end that the Dental Division of such Bureau shall study, plan, and direct all matters coming within the cognizance of such Division, as hereinafter prescribed, and all matters relating to dentistry shall be referred to the Dental Division.

SEC. 3. (a) The Dental Division shall (1) establish professional standards and policies for dental practice; (2) conduct inspections and surveys for maintenance of such standards; (3) initiate and recommend action pertaining to complements, appointments, advancement, training, assignment and transfer of dental personnel; and (4) serve as the advisory agency for the Bureau of Medicine and Surgery on all matters relating directly to dentistry.

(b) The Dental Division shall consist of (1) an office of the Chief of Division, (2) a Dental Standards Branch, (3) a Dental Personnel Branch, and (4) a Dental Liaison Branch. An officer of the Dental Corps of the Navy shall be detailed as the Chief of the Dental Division. Such officer, while so serving in time of war, shall have the rank, pay, and allowances of a rear admiral.

SEC. 4. On shore stations and on ships, all dental services, and dental officers with respect to dental services, shall be under the senior dental officer: *Provided*, That this section shall not be construed to impose any administrative requirements which would interfere with the proper functioning of battle organizations.

The CHAIRMAN. Call the roll, Captain.

(Captain Bogart called the roll and announced there were seven ayes and fourteen noes.)

The CHAIRMAN. The substitute is not agreed to. Now all in favor of reporting the bill as amended by striking out all after the enacting clause and inserting, as one amendment, the committee print of June 7, 1944, as amended, when your name is called, vote aye; all opposed, vote no.

(Captain Bogart called the roll and announced there were twenty-one ayes and two noes.)

The CHAIRMAN. Mr. Rivers' bill is passed. Mr. Rivers, you report the bill to the House and take such steps as are necessary to have the bill passed through the House.

Mr. RIVERS. Thank you, Mr. Chairman.

The CHAIRMAN. I want to thank Mrs. Smith and Mr. Bates for getting through the two bills yesterday.

(The committee thereupon proceeded to the consideration of S. 2019.)

SENATE COMMITTEE HOLDS HEARINGS ON NAVAL DENTAL BILL

The Senate Committee on Naval Affairs recently held hearings on the new Naval Dental Bill S. 715, "to provide more efficient dental care for the personnel of the United States Navy." The bill was introduced in the Senate March 8 by David I. Walsh.

Excerpts from the Senate Committee hearings held May 29 follow:

Senator GERRY: What I am trying to get in my mind is this: What is worrying you, as I understand it, is under battle conditions you do not want a division of authority where they have to go to the commanding officer to decide who is in charge of a force of, say, seven men on that battleship; you are afraid of conflicting authority when you are in a battle situation where you have got to move very quickly and you do not know who is in command; is that it?

Admiral MCINTIRE: Senator, this is a time when I think it is unwise, it is even dangerous, to turn and upset any organization in combatant ships at sea. That is my feeling about it. To tear up our organization at this time is a hazardous thing for the wounded.

If you gentlemen want to set up a separate dental department, that is up to you. As I said before, I will make the thing function. It will be expensive in personnel and material, but to turn and demand now to separate our sections on board our combatant ships and in our teams with the marines taking the dentists out means that there will be confusion. I do not think it is wise at all. It will take a lot of time to send in more personnel to fill in these spaces.

Senator GERRY: Supposing it would take more personnel to fill in these spaces, you would still get the same conflict of authority in the question of battle action; will you not?

Admiral MCINTIRE: No; you would not; because I would fill them up with other personnel to be sure the medical officer could again discharge his responsibilities to his commanding officer. That is what I would attempt to do from this end. That is, I would go to Admiral Jacobs and ask for the additional personnel to do that.

Senator ELLENDER: But, Admiral, we come back to the same thing. Under battle conditions they are all under the supervision of the commanding officer of the ship.

Admiral MCINTIRE: All right; but I don't know how he is going to set that up either.

Senator ELLENDER: I do not know. I do not see why you should not have the faith in the dentists that you have in your own profession in connection with your own medical men. I just think they are as patriotic as the doctors are.

Admiral MCINTIRE: There is no question about that.

Senator ELLENDER: I understand that; but at the same time you are questioning that under battle orders they are going to simply run away from it, or they will not do their duty. It just strikes me you are wrong in your assumption. It strikes me very forcefully that any man who would take a position like that in battle should not be an officer of any kind, he should not even be a dentist or a doctor. . . .

Senator SALTONSTALL: Doctor, supposing, for instance, a man is sick and the medical officer on the ship asks the dental department to give him an x-ray of his jaw, and as the result of that x-ray the doctor says that the dentistry department should perform an operation on his jaw, and the dentistry department says, "No, an operation is not necessary." If this bill becomes law the only person that can decide that matter is the commanding officer on the ship, who is a layman; is that right?

Admiral MCINTIRE: Theoretically, that would be correct; yes.

Senator SALTONSTALL: Isn't that practically correct?

Admiral MCINTIRE: Yes; that is practically correct. I would hope we would never come to such a thing even with a division, but it could happen.

Senator SALTONSTALL: But under the present law a medical officer could order the dentistry department to perform an operation?

Admiral MCINTIRE: Yes, he is responsible, that is, the medical officer on the ship is responsible for the health of all the officers and men on that ship, he is directly responsible to the commanding officer for them.

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July 1 **EDITORIALS** 1945

THE WAGNER-MURRAY-DINGELL BILL OF 1945

A new Wagner-Murray-Dingell bill* has been introduced into Congress, and again it is found to be a fairly radical revision of its predecessors. Unlike the first two bills, of 1939 and 1943, this one includes a rather extensive program for dentistry.

The bill was introduced in the Senate (S. 1050) by Robert F. Wagner, New York, and James E. Murray, Montana, and referred to the Committee on Finance. In the House of Representatives, the bill (H. R. 3293) was introduced by John D. Dingell, Michigan, and referred to the Committee on Ways and Means. It is significant that both the Senate and the House referred the bill to committees that will consider it as a revenue-raising proposal and not as a social measure. Senator Wagner, on the introduction of the bill, stated that he had been given assurances that hearings would be held.

Basically, the bill is a series of amendments to the Social Security and Public Health Service Acts, the general purposes of which are to enlarge the benefits and extend the coverage of the social insurance program. More specifically, the bill would:

1. Establish a national social insurance system consisting of prepaid personal health service; unemployment and temporary disability insurance on a uniform, national basis, and retirement, survivors' and total disability insurance with liberalized benefits.

*See J.A.D.A., 32:792, June 15, 1945.

2. Authorize a ten-year program, costing $950,000,000, for federal grants and loans for the construction and expansion of hospitals and health centers.

3. Provide grants to states for expansion of health services, maternal and child health and welfare services, and for public assistance to needy individuals such as the aged, the blind and dependent children.

4. Extend coverage of the basis of the social insurance system to farm and domestic workers, employes of nonprofit institutions, independent farmers, professional persons and small business men.

5. Provide for a national system of employment offices.

All of these insurance benefits, Senator Wagner told the Senate, could be financed now and for several years after the war by a total contribution of 8 per cent, of which 4 per cent would be payable by employers and 4 per cent by employes on earnings up to $3,600 a year. Additional funds to support the program will have to come from general revenue.

Dentists will be concerned chiefly with Title II of the bill. Under this provision, every individual who is currently insured and all of his dependents who are not insured are eligible to receive "personal health service benefits." These benefits would be distributed through a panel system of practitioners and administered by the Surgeon General of the U. S. Public Health Service in consultation with a national advisory medical policy council. Payment for services would be made on a basis of (1) fee for service, (2) the number of individuals entitled to benefit who are on a practitioner's list; (3) salary, whole or part time, and (4) a combination or modification of these bases.

The bill defines the term "personal health service benefits" as including general medical benefit, special medical benefit, general dental benefit, special dental benefit, home nursing benefit, laboratory benefit and hospitalization benefit. The Surgeon General, "having regard for the adequacy of available personnel," may restrict the content of these dental benefits until January 1, 1947, when "the restricted content of general dental or special dental benefit shall include at least (1) examination (including x-ray survey) and diagnosis; (2) prophylaxis; (3) extraction of teeth which are considered by the dentist and an attending physician to be or likely to be injurious to the general health of the individual, and (4) treatment of acute diseases of the teeth, their supporting structures and adjacent parts, including fractures of the teeth or jaws." The bill also gives permission to restrict the content of these benefits at certain age levels.

The new Wagner-Murray-Dingell bill, as can be seen even from this brief summary of its 185 pages, will require close study and analysis to determine what its provisions mean and, just as importantly, what they imply. Dentists should examine the bill carefully so that they can determine for themselves its ultimate effect on methods of rendering dental service in this country.

SURPLUS PROPERTY AND LOCATION SURVEYS FOR THE RETURNING DENTAL OFFICERS

Almost one-third of all of the dentists in the country are in the armed services, and their return to private practice will create several problems that must be solved in terms of doing everything possible to aid the veteran dental officer. The survey[1]

1. See J.A.D.A., 32:568, May 1, 1945; 692, June 1, 1945; 745, July 1, 1945.

made by the War Service and Postwar Planning Committee of the American Dental Association has revealed the major categories of need, and dental societies—at the national, state and local levels—are working out programs to meet them. Substantial progress has already been made in several directions.

It is obvious that veteran dental officers have a right to high priority in obtaining equipment and supplies that have been declared surplus by the government. This priority, in part through the efforts of the War Service and Postwar Planning Committee, has now been granted by the Surplus Property Board, which will make surplus dental items available through the Smaller War Plants Corporation, rather than ordinary commercial sources. The problems of pricing, availability of equipment and term payments are still under consideration, but the basic right of the veteran to preference has been recognized.

Of the dentists who entered the armed services from private practice, the survey shows, 93 per cent intend to return to that type of practice. Twenty-two per cent do not intend to return to their original locations and an additional 9 per cent are undecided about doing so.

This clearly reveals the need for establishing some program that will aid the returning dental officer in finding a productive practice in a new location. A study made by the Minnesota State Dental Association is outstanding in this regard because the existing resources and potential dental needs of each community have been evaluated. On the basis of such studies, an intelligent choice of locations can be made and there can be the additional benefit of securing a better distribution of dentists throughout the state, particularly in counties that are now without adequate dental personnel.

The Committee on Economics of the American Dental Association has recognized the need of such statewide location surveys and is now initiating a program under which constituent societies can carry them out with the aid and guidance of the national committee. It is hoped that all state dental societies will immediately get such surveys under way, in order to help the dental officers who wish to return to practice and in order to ascertain definitely what the needs of the communities and state are in terms of dental personnel.

"SAUCE FOR THE GOOSE . . ."

Dentists will be interested in the implications that are to be found in the following article taken from the military press[1]:

An order approved by the Secretary of War and signed by General of the Army George C. Marshall, Chief of Staff, makes it clear that the Surgeon General of the Army is "the chief medical officer of the Army" and not merely the Surgeon General of the Army Service Forces.

The fact that the authority of the Surgeon General had been greatly circumscribed by placing him in the Army Service Forces was recently commented upon by Representative Frances Bolton, of Ohio, who stated that it was only because of the fact that General Brehon Somervell, commanding Army Service Forces, and Maj. Gen. Norman T. Kirk, Surgeon General, got along so well together as individuals that the present system was able to function efficiently.

Dentists, particularly those who are serving in the Army, will wonder about two

1. Army-Navy J., May 12, 1945.

things: (1) Why did the Surgeon General feel it essential to secure a ruling on his own status when he himself has resisted a similar clarification of status for the Army Dental Corps? (2) Why does the Surgeon General show obvious resentment at what must have been interference in his own affairs when he continues to permit medical interference in purely dental affairs in corps that lie under his jurisdiction?

Every argument for the improvement of status of the Dental Corps can now be reinforced with the arguments used by the Surgeon General himself. "Sauce for the goose is sauce for the gander."

CAPTAIN DAVIS ON NEW ASSIGNMENT

After a term of duty as chief of the Naval Division in the Bureau of Medicine and Surgery, Capt. Robert S. Davis has been given a new assignment in San Diego. Captain Davis has discharged his duties with uncommon distinction in a time when the Naval Dental Corps was engaged in the greatest and most difficult task in its history.

He brought to his work a fine record in the Navy, high ability as an administrator and a devotion to the problems of his corps and of dentistry as a whole. His courage and leadership have been self-evident. He has worked ceaselessly to provide the highest type of dental care to the millions of men and women who comprise the Navy. His contributions have been as many as they have been distinguished and dentistry acknowledges them with deep appreciation and gratitude.

GROUP PRACTICE IN DENTISTRY: THE HYSER PLAN

The so-called Hyser proposal for group practice was handed as the personal and individual effort of its author to the Senate Subcommittee on Wartime Health and Education, popularly known as the Pepper Committee, in 1943. Senator Pepper and the committee later took pains to announce that its receipt of the proposal "in no way constitutes an indorsement by myself (Senator Pepper) or the subcommittee of all or any part of its content."[1]

One of the weekly news magazines then picked up the story and the proposal was soon ticketed as one for "belt line" dentistry. The subsequent hullabaloo, in and out of the profession, was considerably larger than any importance which can be attached to the plan after an analysis of its proposals.

The Hyser plan, shorn of the somewhat cosmic implications that proponents have tried to read into it, is simply a proposal for group practice in dentistry. Its only novel features are the limiting of the dentist to a single operation in which he is expert and the passage of the patient from expert to expert in the group until the work is completed. Such a system, in industry, is used to secure mass production. Whether it can be applied in dentistry to the variable and complex problems of dental restorations remains to be seen. Thus far, all favorable evidence is limited to the statements of the sponsors of the plan.

The explanation of the program in this issue of THE JOURNAL[2] does not breed a great deal of additional confidence in its ultimate soundness. Hyser, for example,

1. N.Y.J. Dent. 13:179, May 1943.
2. See page 853.

attempts to support his plan by citing figures and then attempts to take the wind out of the sails of some of his critics by saying that the proposal is not based upon these particular figures. If the figures he gives are being used to support the plan, they are a proper target for criticism and more than one commentator has availed himself successfully of this opportunity. If the figures do not support the plan, one is to wonder why they are quoted at all.

The main arguments against the plan are more than statistical. The Hyser plan fails to pay significant attention to the human values that must enter into both the giving and the receiving of dental care. There is a difference between handling human tissues and handling inanimate objects, and the mere statement of the author that his plan does not "mechanize" dentistry does not necessarily make it a fact.

There has also recently been a marriage of convenience between the Hyser plan and the proposal of McCall to employ auxiliary personnel in dentistry in jobs for which they are neither licensed nor trained at present. This union may or may not improve the original Hyser plan. It certainly does not make an evaluation of its ultimate usefulness or purpose any easier.

Thus far, there is nothing in the record, other than verbal evidence, to support either proposal or both. True, an organization with the impressive title of "The American Association for Dental Health" has been founded to implement the Hyser-McCall programs. It is difficult to see why such formidable organization is necessary to carry out what are, after all, rather simple experiments in group practice. The energy and effort of devising and finding support for a new agency might well have been used to conduct experimental work through qualified existing agencies. The proposals, if sound, will not suffer from such impartial examination. If they are not sound, not even the prestige of a special organization will be of much help. The time is here when such proposals as this must be tested in practice and not coddled into an importance not justified by realistic achievement.

DENTAL REORGANIZATION IN THE BUREAU OF MEDICINE AND SURGERY

The record of Senate and House hearings shows that the Navy Department has consistently opposed any effective change of status for the Naval Dental Corps, even though high-ranking officials have admitted the existence of discrimination and inequalities. There have also been repeated statements that legislation was not necessary and that all needed changes could be secured through the alteration of departmental regulations. Finally, there were open statements by the Surgeon General that there would be no reprisals on the Dental Corps or its individual members for the parts played in revealing the serious need for corrective legislation or regulation.

It is not difficult to reconcile this record of cynical reaction with recent events in the Naval Dental Corps:

(1) The Dental Division of the Bureau of Medicine and Surgery has, in effect, been abolished.
(2) The position of chief of the dental division has been abolished and in its place a new post of Assistant to the Surgeon General for Dentistry has been established in the Bureau of Medicine and Surgery.
(3) The rank of admiral is no longer to be given to the post of Dental Inspector.

(4) Under a new ruling, no dental officer above the rank of lieutenant commander is to be assigned to any ship (except a hospital ship.)

It is true that, in these changes, one of the proposals made many times by the American Dental Association has been accepted: the head of the Naval Dental Corps should have the rank of rear admiral. But this small gain is very seriously tempered by the fact that the proposal was accepted by the Navy only after conditions had altered so that agreement to it actually became a reprisal on the Naval Dental Corps.

That rampant inequality governs the relations between the medical and dental corps in the Bureau of Medicine and Surgery has long been apparent to the disinterested observer. It is apparent to the members of the House of Representatives, who unanimously passed a bill to correct it. It is apparent to many members of the Senate committee, which has held hearings on it. It is apparent to the list of high-ranking dental corps officers who testified to that effect in spite of the danger of reprisals that have now become real. It is apparent to every other member of the Dental Corps who has had a taste of medical domination and interference in his work.

In the face of such evidence, the actions of the Navy Department, which must have had, at least, the tacit approval of the Surgeon General, should be known for what they are: derisive gestures at Congress, at the members of the Naval Dental Corps and at the dental profession. If this were the first evidence of mossbacked reaction, of stuffy maladministration and of a salty defense of an indefensible position, perhaps the matter could pass. But this time the affront has been too great. Dentistry, through every means in its power, should attempt to force the correction of these inequalities. This should not be attempted in a punitive spirit. The case for a change of status in the Naval Dental Corps is just and self-evident. It only remains to bring this new episode of flouting a reasonable effort at improvement to the attention of Congress.

CAPT. C. RAYMOND WELLS ENDS DUTY IN WASHINGTON

After four years of duty as chief dental officer of the National Selective Service System, Capt. C. Raymond Wells, USNR, has been assigned, at his own request, to a new post. Captain Wells served in a difficult position during the early months of the war when decisions were being made to determine the ultimate effectiveness of the dental contribution to the war effort. He had an important part in outlining policies so that essential activities could be carried on and a needed supply of dentists trained for the armed forces. He also served as President of the American Dental Association when wartime and other problems were particularly difficult. His work and efforts of the past four years represent a significant contribution to the profession.

REPORTS OF COUNCILS AND COMMITTEES

COUNCIL ON DENTAL EDUCATION

DENTAL SCHOOLS PLAN EXTENSIVE POSTWAR BUILDING CAMPAIGN

The Council on Dental Education believes strongly that dental schools, rapidly approaching complete university control throughout the country, are entitled to be housed and equipped on a level with all other professional schools in the university circle. Accordingly, in the survey of the dental schools, which has now been completed, close scrutiny was given to the physical plants of all the schools. In employing such general objective data as it could command and in visiting the schools and observing conditions at first hand, the Council found that the schools studied fell into three groups, as follows:

Group 1, numbering fourteen schools, is housed in excellent, modernly constructed buildings designed in every instance for the teaching of dentistry. The equipment in all of the schools in this group is modern and is adequate for teaching needs. The plants and equipment in this group compare very favorably with like provisions for teaching in other units of university administration and are a great credit to dentistry and to dental education.

Group 2, numbering twelve schools, is housed in buildings which are past their prime and are far from ideal, though it cannot be said that the buildings are outmoded. They will serve their purpose, if necessary, for a considerable period. The equipment of the buildings that are in this group tends to be reasonably satisfactory and it rivals in some instances the equipment in Group 1.

Group 3, numbering thirteen schools, is housed in old buildings, many of which are not adapted to the conduct of a modern program of dental education and which cry out for modern replacements. Happily, the equipment in the majority of the buildings in this group, especially in the clinics, has been kept fairly well abreast of the times.

The encouraging side of this picture, as we face the changing order which will inevitably follow the war, is the unprecedented building and equipment program in contemplation. The new buildings which will be started as soon as materials are available after the war promise well for dental education. An account of some of the plans in early prospect seems appropriate at this time.

College of Dentistry
University of Tennessee

The University of Tennessee's appropriations made by the state legislature early in 1945 include funds for the construction of a new dental building on the southeast corner of Dunlap and Monroe Avenues, Memphis. The site, already owned by the university, will locate it adjoining university buildings which house the biologic sciences and medical schools.

The new dental building will be a five-story reinforced concrete structure, brick veneered and stone trimmed, a duplicate of the U. T. anatomy building,

Building to be erected by Loyola University, Chicago, to house the schools of dentistry and medicine.

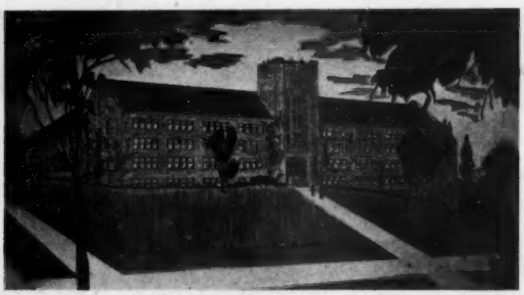
one of the present constructions of the health center group. The departments to be housed will include operative dentistry, prosthetic dentistry, oral medicine and surgery, and the crown and bridge departments. This will be an improvement and enlargement of the old facilities for undergraduate students now being used in a remote location at 718 Union Avenue. For a while, the new building will adequately care for undergraduate training of dentists, refresher courses for returning veterans and civilian practitioners and courses for auxiliary workers such as dental hygienists and dental technicians. But, because of the shortage of dentists, particularly in this section, the undergraduate enrolment should be increased to 400 students. The plans, therefore, have stressed the needs of undergraduate dental training. The staff will be increased as the increase in students makes it necessary. The plans, also, will include clinical dental services to Negroes.

There is a very definite need for a graduate school in dentistry in this section of the country and, with this need in mind, the design of the new undergraduate building has been made suitable for an addition which it is hoped later can be made to house all dental graduate and auxiliary training. The fulfilment of this need, however, will depend on substantial aid from outside agencies. As the undergraduate enrolment increases to the desired 400 capacity, it will become necessary to provide other space for the continuance of refresher courses and training of auxiliary dental workers.

Construction of the undergraduate dental building will begin as soon as the government will approve the university's application to so do and to purchase essential equipment for the new building.

Chicago College of Dental Surgery School of Dentistry, Loyola University

Loyola University plans to erect, after the war, a combined medical and dental schools building to be located somewhere in the Medical Center area. Present plans call for the erection of a building eight stories high, to be built in Y-shape, to house the school of medicine in one wing and the school of dentistry in another and having in its central block space for a laboratory, library,



New building for School of Dentistry, University of Kansas City.

auditoriums, lunchroom and recreation facilities, to be used as far as possible in common by the students and faculty of the two schools. Behind this arrangement is the desire of the two faculties and of the university to bring the members of the two professions into as close cooperation as possible.

The building is to cost approximately $1,500,000, exclusive of furnishings. It is to have wide spaces for clinical facilities, particularly a dental clinic, and will have an approximate floor area of 220,000 square feet and a cubic volume of 2,900,000 feet. Plans call for a maximum enrolment of 400 medical and 400 dental students. The main auditorium will have a capacity of 1,000. The usual animal rooms, laboratories, etc., will be provided. Exact details of the interior construction of the building have not yet been fully approved.

Kansas City-Western Dental College School of Dentistry, University of Kansas City

The University of Kansas City has developed preliminary plans for a school of dentistry building to be erected on the campus at Fifty-First Street and Troost Avenue. When the Kansas City-Western Dental College was merged with the university, a large tract of campus ground was designated as a building site for the dental school. With the beginning of the 1943 session, the freshman class was established on the campus in buildings recently erected.

The building proposed will provide five floors including the basement, which is above ground on two sides, and the general design of the building will be in harmony with other structures on the campus.

The plan provides for 150 cubicles on the general clinic floor, each one a complete operating unit for a student assigned as a junior for his two years of clinical practice.

Consultation rooms, radiographic rooms and all rooms where patients are served will be provided with elevated view stands. A number of seminar rooms are shown on the plan and each instructor's office is to be fitted for research and experimental procedures. The oral surgery department on the floor above the general clinic provides diagnostic, recovery and hospital rooms, as well as an amphitheater, with a seating capacity of 75.

A specific feature is the use of the space just under the roof as a residential section. The space will accommodate about sixty postgraduate or graduate students; also, faculty dining room facilities. With the installation of air conditioning and modern lighting equipment, every space can be successfully used.

The university has this building and other units on its agenda for considera-

tion when materials and labor are reasonable and available.

Dental School
Tufts College

The fund for the development of the Tufts College Medical and the Tufts College Dental Schools is progressing in a most satisfactory way, the combined fund now reaching a total in excess of a million dollars. It is estimated at the present time that $1,300,000 is necessary in order to begin building.

The plan calls for the erection of a new building or of new buildings to house the Tufts College Medical School and the Tufts College Dental School in the region of the other buildings of the New England Medical Center. Tufts College is the teaching base of all units of the New England Medical Center, and the clinical staffs of the various units of the Center are also affiliated with Tufts. Other large building projects are under way at the Center, and it is anticipated therefore that, by the time the new medical and dental schools are erected, there will be not only the present buildings of the Center, which include a large and complete outpatient department and dispensary, a complete general children's hospital and the new Pratt Diagnostic Hospital, but also certain large new clinical centers. This development will make possible setting up for the Tufts Dental School large, modern, new clinics as well as classrooms and research and teaching laboratories.

The exact way in which the new organization is to be established has not yet been decided because all the cooperating agencies are anxious to make the fullest possible use of existing as well as new buildings.

School of Dentistry
University of Texas

The board of regents of the University of Texas has approved a new building for the dental school to cost $1,000,000 and has also approved a plan of education to be conducted by the dental branch in Houston on the New Texas Medical Center. The units to be included under the program of the dental branch are: the school of dentistry, the college of dental nursing, the postgraduate institute of dentistry and stomatology and the institute of orthodontics. Also to be included in Houston under the auspices of the university will be postgraduate training in medicine, the institute of geographic medicine and the school of public health.

College of Dentistry
Ohio State University

A new health center is being developed at Ohio State University. The university is asking the legislature for an appropriation of $5,000,000 in the current biennium, $800,000 of which will be used for a new dental building. This is to be a separate building, but in close proximity to the hospital and the medical school. Although definite plans have not been drawn up, and will not be until the appropriation has been made, the architect's estimate of $800,000 is based on plans for providing undergraduate instruction for at least seventy-five students in each of the four classes; a hygienist school of fifty in each class, and a wing for postgraduate work to accommodate at least thirty dentists at a time.

The postgraduate wing will include three separate clinics of ten chairs each with laboratories and classrooms so that three courses could be given at one time.

School of Dentistry
Loyola University, New Orleans

Plans are now being prepared for the new school of dentistry which is to be erected on the Loyola University campus as soon as building conditions permit. Four hundred thousand dollars of the university building fund has been allocated for this new dental building, excluding equipment and furnishings. A

four-story structure 98 by 212 is being planned. Completely up-to-date equipment throughout the building will be provided to facilitate the clinical, technical and science teaching.

School of Dentistry
University of Louisville

The University of Louisville is making plans for a new physical plant, but anticipates that these plans cannot be put into operation until some time after the close of the war.

The plans call for two buildings, one of which will be a clinical annex to the Louisville General Hospital and the other a preclinical building adjacent to the school of medicine. Because of the need for coordination of both the basic science and clinical phases of the educational programs in medicine and dentistry, a closer physical relationship is desirable, and these building plans have been formulated with these objectives in mind.

Under this arrangement, all of the preclinical teaching will be carried out in the basic science departments of the medical school and the proposed preclinical dental building adjacent to the medical school. All clinical teaching would be done in the dental annex of the Louisville General Hospital, where a wide variety of patients with complete medical histories would be available and where closer consultation with the medical staff would be possible. The Louisville General Hospital and the School of Medicine are located within 100 yards of each other.

Dental School
Marquette University

The immediate need of Marquette University is a new classroom building for the college of liberal arts and a new library building for general university use. The funds for both buildings are already set aside by the university administration, and construction will begin as soon as labor and materials become available.

It is the present intention of the administration to then complete the second wing of the dental building, four stories in height and running 80 feet south and 62 feet east of the building occupied at present. The new wing will provide the following additional facilities: ground floor, special laboratory for dental materials, and new quarters for dental hygienists, including a classroom, a technic laboratory, a special locker room and rest room; first floor, research laboratories for graduate and postgraduate students in dental metallurgy and dental technics, biochemistry and pharmacology, two classrooms for graduate and postgraduate students, a research conference office and a faculty committee room; second floor, a children's clinic of twenty-seven chairs, an orthodontics clinic and laboratory for undergraduate and graduate instruction; third floor, a library 28 by 62 feet and stack room 28 by 20 feet and new quarters, including offices, clinics and laboratories for graduate and postgraduate students in the department of dental prosthetics.

The vacated space in the present building will provide facilities for an operative dentistry clinic and an operative dentistry and ceramics laboratory for graduate and postgraduate students.

College of Dentistry
University of California

The college of dentistry of the University of California will share in the postwar building program of the university. The state legislature has appropriated $26,000,000 for new buildings on the eight campuses of the university. Six million dollars of this appropriation will go to the San Francisco campus, where the college of dentistry is located. The plans for the San Francisco unit include a teaching hospital, a science building, a nurses' dormitory and an expansion of the dental clinic. The school

of dentistry will have facilities for oral surgery as well as bed space in the new hospital. The new science building will house the teaching, research and library needs of medicine, dentistry, nursing and pharmacy.

School of Dentistry
Georgetown University

A new hospital is being erected at the Georgetown University Medical Center in which the school of dentistry will share. A dental clinic will be established in the outpatient department. In connection with the surgical suite, a demonstration room will be provided for clinical pathologic conferences and for demonstrations.

School of Dentistry
University of Washington

The state legislature of Washington has appropriated $4,500,000 for the erection of buildings for new medical and dental schools.

In addition to the above-outlined new buildings and additions, which will, in all probability, be erected within five years after materials are available, long range plans are being considered for new buildings in enlarged medical-dental centers in several other institutions, including the college of dentistry of New York University, the college of dentistry of the State University of Iowa, the school of dentistry of the Medical College of Virginia, the school of dentistry of Temple University and the college of dentistry of Baylor University.

It thus appears very likely that within ten years after the war, dental education in the United States will be housed and equipped acceptably all along the line. The Council on Dental Education is deeply gratified at the interest exhibited by boards of trustees and university presidents in the physical needs of their dental schools. The outlook is indeed promising.—*Harlan H. Horner, Secretary.*

COUNCIL ON DENTAL HEALTH

REPORT OF THE MISSOURI STATE COUNCIL ON DENTAL HEALTH

During the last year or two, a number of state councils on dental health have seriously attempted to carry out the duties assigned to them. Some of the more active state councils have made a study and analysis of the dental health problem with a view to arriving at certain basic conclusions. These conclusions, it was believed, would serve as a preliminary step in developing plans and programs for the provision of more adequate dental care for the public.

The work thus far has resulted in a number of policy making reports by state councils on dental health, which, in turn, have been submitted to and approved by state societies. The following report of the Missouri State Council on Dental Health contains conclusions and recommendations for providing dental care for the people of Missouri.

A series of problems are facing the profession of dentistry in Missouri in the rapidly growing trend for an all inclusive health service plan.

With the establishment of the national Social Security System, ambitious individuals and organizations began immediately and have continuously attacked the standard system of health service in an effort to expand government social service to include medical care. From a small beginning not many years ago, the United States Public Health

Service, the Children's Bureau, the Farm Security Administration and other government agencies have succeeded in extending some sort of health care program into the homes of men, especially those of the armed forces.

While much of the agitation for expanding health care to all stems from ignorance of the health professions' practices and limitations, it is clear and understandable that health care should be extended to all of the people in any complete health service to a community. The American Dental Association recognizes this fact and at the meeting of the House of Delegates, 1944, revised the eight original principles governing the establishment of dental health plans to include the following:

"Dental Care: (a) Dental care should be available to all regardless of income or geographic location. (b) Programs developed for dental care should be based on prevention and control of dental diseases. All available resources should first be used to provide adequate dental treatment for children and to eliminate pain and infection for adults. (c) Dental health is the responsibility of the individual, the family and the community, in that order. When the responsibility, however, is not assumed by the community, it should be assumed by the state and then by the federal government. The community in all cases shall determine the methods for providing service in its area."

Numerous excellent health service plans are now well established. The Blue Cross Plan with more than 15,000,000 subscribers is but one in which hospital benefits are constantly increasing and costs decreasing. Such health service plans, however, depend upon the intelligence and the desire of the people to pay in advance a premium in health insurance that is limited in scope. None of these plans are now reaching the majority of the 130,000,000 people of our country who are totally indifferent to adequate health service, especially dental. While education is the best weapon against indifference, its action is slow and undoubtedly may never reach more than a majority of this gigantic group. Voluntary prepayment health service plans, meritorious though they are, cannot answer fully the all inclusive community health care problem.

Dentistry's place in any complete health service plan is fixed and fully recognized. Dentistry is essentially a part of health service, and while very few health service plans now include dental service in their setup, in any movement involving medicine, dental service must eventually follow. What has happened to affect the practice of medicine will eventually affect the practice of dentistry and may well be heeded as a straw in the wind.

In presenting a plan for dental service to a community, the Council on Dental Health recognizes many problems, some of which seem greater than those of any other unit of health service. Probably the greatest of these problems is public indifference and aversion to dental service. This alone makes the inclusion of dental service in prepayment planning difficult if not impossible. Other problems now facing the profession include indifference on the part of the members of the profession to an extension of their services to persons other than a select few adults in their community, and manpower shortage when extension of dental service to greater numbers is contemplated. In community dental health care planning, manpower shortage stands most serious in the profession's answer to the rapidly developing health movement.

A Dental Service Plan

Facts lead us to the conclusion that without dental health education the majority of people will ignore dental service even if it is provided for them free of cost. Yet ignorance and indifference cannot be made an issue in community health planning. A health service plan does not solve our problems if it excludes the indigent, racial groups or families who for many reasons do not subscribe to a pre-payment health service plan. Our plan, therefore, should be dental health care to all.

Recommendation 1: Authority. — When funds are available for a community dental health program, it should be required that representatives of organized dentistry participate in all conferences that may lead to the establishment of the plan, that all dental service performed within an established plan be under direct supervision of a dentist and all supplies and records pertaining to the conduct of the dental service should be the direct responsibility of the dental supervisor.

Recommendation 2.—A state or community dental health care plan should have as its aim dental service of a high quality directed primarily to children and basically as follows: (a) a complete clinical examination of all tissues of the oral cavity using mouth mirror and explorers, and x-rays when required; (b) charting of and recording of all lesions; (c) repair or removal of teeth as indicated; (d) removal of all calcareous deposits on teeth and treatment of gingival infections; (e) reference to or consultation with other health service specialists relative to lesions of the soft tissues of uncommon character and not usually treated by the dentist.

Replacements of lost teeth, definitely a health service, may or may not be included in a health service plan, may or may not be charged to the plan and may or may not be performed by the dentist on service time.

All dental service being individual in grade and kind, recipients of service must be privileged to choose their doctor.

Service and administration should be adapted to local needs and conditions consistent with the adopted general state plan.

Recommendation 3: Dental Health Education.—A completely organized dental health education plan directed by the dental division of the state or municipal health department or the Council on Dental Health of the Missouri State Dental Association should be a segment of the service plan and should be included in the public and parochial school curriculum. No dental health educational plans should be acceptable unless approved by these agencies.

Dental health education should include information on prenatal care, dentistry for children, accepted principles of prophylaxis, bacteriologic conditions of the oral cavity, diet, function and general oral health measures.

Recommendation 4: Financing the Service.—In financing a dental health service plan according to the needs of a community, a number of facts should be known, such as density and age composition of population; number of people in various racial groups; living and housing conditions; variations in income levels; differential in cost of living in urban and rural areas; income problems; sanitation and health, and educational levels.

In the absence of such statistical studies, the first requisite of a satisfactory dental service plan is the establishment of a service proposal and a basic fee or salary schedule satisfactory to the doctor and commensurate with the quality of service demanded. Fees or salary for service in a clinic or private office may be paid on a monthly schedule based on living costs comparable generally with urban and rural practice in the state.

Recommendation 5: Reexamination.—It is believed that a well planned and executed community dental health service should, by careful recording and periodical service to its people, become less costly through the years. Careful check, therefore, should be maintained and follow-up service be required.

It seems logical that the dentists of a community should be concerned about the dental needs of their community as well as the methods to be used in meeting those needs. By law, the dental health of the community is to be administered by a licensed dentist and the public logically expects him to advise it about any dental health problems. Only in accepting leadership in these matters will public confidence in the profession be maintained. The initial steps should, therefore, be taken by the dentists themselves.

Method of Approach

The following procedure suggests itself:

Conference of Dentists of Community.—A conference of the dentists of the community to talk over the dental problems of the community should be held. This should be a matter of positive procedure, not one of negative action. Steps should be taken to obtain certain basic information.

(a) The population of the service area should be divided into age groups, such as:

Number below 3 years of age.
Number 3-6 years of age.
Number 7-12 years of age.
Number 12-18 years of age.
Number over 18 years of age.

(b) Plans should be developed to ascertain the dental needs of these various age groups.

(c) A study of the available dental manpower and facilities should be made.

Evaluating the Studies.—When the foregoing information is available, a second conference of the dentists of the community should be held to study these reports.

If these studies indicate that the dental

health needs of the community are being cared for adequately, a summary report should so indicate. Such a report should be in readiness for reference should the need arise.

If, however, the studies indicate that the community dental health needs are not being adequately cared for, the following questions might logically be considered:

If there is a need that is not being cared for, is it (a) because dental service hours are not available; (b) because the persons needing services do not seek them, or (c) because the public cannot afford to pay for them?

The questions should be thoroughly discussed to the extent that recommendations can be made for meeting these problems when conferences with lay groups are held.

The questions raised above are all of professional concern. If sufficient dental manpower hours are not available, two alternatives present themselves; namely (a) increasing the number of hours, by providing more hours each day, or by obtaining the services of more dentists, or (b) adjusting the service that is to be rendered to the available hours.

The latter procedure suggests a thorough study of conditions to develop a program that will be most beneficial, weighing relief and temporary service against a long range program.

If the studies show that groups of the population are not seeking dental services, a program of dental health education suggests itself.

If dental services are not received because of lack of funds to pay for them, studies should be made to determine the amount of funds necessary to provide the needed services.

The raising of the funds is not a problem for the profession, but the profession of the community should determine what services are to be rendered and how they are to be rendered and should be ready to advise how much money it will take to do this.

Generally speaking, it would seem desirable that the private dental office should be used for rendering services. There may be conditions that would suggest clinics, health centers, trailer service and the like. These plans, before entered upon, should be thoroughly studied and evaluated; for, once they are established, it may be difficult to discontinue them, if that becomes desirable.

Having determined upon an education program or the need for financial help in the service program and having the details well in hand, the professional group is ready to take the next step; namely, to place its problem before interested lay persons or lay groups.

Conference of Lay and Professional Groups.—The joint conference of lay and professional groups might logically be called by the professional group, thereby indicating leadership and concern in the dental health problem. But it would probably be best to step into the background after the matters have been presented and a community dental health council has been organized of which the dentists are members.

The dental profession should always be on the alert to advise on all dental health matters, including the question of how the dentist is to be paid for his services. Dental care must be provided in the same manner as is food, shelter or any other essential of life. It is the American custom and tradition that man shall supply these things for himself.

Experimental Plans

Communities may, if they desire, set up experimental plans. They should look to the state council on dental health or the Council on Dental Health of the A.D.A. for guidance and suggestions.

Compensation for Services

The dentists in each community shall have the privilege of determining the basis on which they are to be paid: fee schedule, salary, per capita or per unit of time or a combination of two or more.

However, in cases wherein he is employed on a full-time basis (not more than forty hours per week), his salary shall not be less than $300 per month net in rural areas, and proportionately more in areas where living costs are higher.

Costs

The initial cost of a completely equipped dental operating room in a hospital or public building should not exceed $4,000. Instrument replacements and materials should not exceed $700 annually.

Limited Services

Studies having revealed the needs in various age groups as well as a need for limiting services, consideration should be given to the most effective program under the circumstances.

Competent studies of dental treatment facilities indicate that neither funds nor personnel are available for a complete treatment program for the American people. Thus realism demands that, in planning for community dental programs, we should consider policies and procedures that will achieve the greatest good with the facilities at hand, and that will also be effective in expanding facilities.

Early and continued dental care for the younger age group is of primary importance if the high incidence of tooth loss is to be reduced in the population. Just as modern medicine has lengthened the expectancy of life, so can modern dentistry lengthen the expectancy of tooth life by providing early dental treatment for children, followed regularly by a constant routine of maintenance treatment.

Methods of Providing Treatment

The factors which will influence the choice of treatment services are

1. The availability of established clinics.
2. Dentists' interest in children's dentistry.
3. Ratio of dentist to the general population.
4. The comparative costs of dental service as between the clinic and the practitioner.
5. Transportation facilities for patients.
6. The costs of establishing and maintaining new clinics.
7. Administrative problems associated with clinic or private office.

Experience has shown that fixed dental clinics are more feasible in the larger centers of population. On the other hand, there are sparsely settled sections of this country where practitioners are not available. This situation has been met in many instances by the use of mobile dental clinics or portable dental equipment, usually provided by the state health department. In other instances, children have been brought to private dental offices and clinics in station wagons, school busses and automobiles.

The remainder of the plan is taken from and follows exactly pages 7-17 of the booklet "A Dental Care Plan for Low Income Groups" prepared and published by the Council on Dental Health, American Dental Association.

The foregoing statement on "Dental Care for the People of Missouri" and the recommendations that it contains were approved by the Missouri State Dental Association during the annual meeting, May 13, 1945. — *Allen O. Gruebbel, Executive Secretary.*

COUNCIL ON DENTAL THERAPEUTICS

REPORT OF THE SIXTEENTH ANNUAL MEETING

The sixteenth annual meeting of the Council on Dental Therapeutics was held at the American Dental Association Headquarters Building, 222 East Superior St., Chicago, Ill., Friday and Saturday, March 23 and 24, 1945.

The following members of the Council were in attendance:

J. Howard Brown, Ph.D., Sc.D., Johns Hopkins University, Baltimore, Md. Edward C. Dobbs, D.D.S., University of Maryland, School of Dentistry, Baltimore, Md. Paul J. Hanzlik, M.D., Stanford University School of Medicine, San Francisco, Calif. Thomas J. Hill, D.D.S., Western Reserve University School of Dentistry, Cleveland, Ohio. Milan A. Logan, Ph.D., University of Cincinnati, School of Medicine, Cincinnati, Ohio. Arno B. Luckhardt, M.D., Ph.D., Sc.D., LL.D., University of Chicago, Chicago, Ill. Harry Lyons, D.D.S., Medical College of Virginia, School of Dentistry, Richmond, Va. H. Berton McCauley, D.D.S., University of Rochester School of Medicine and Dentistry, Rochester, N. Y. Victor C. Myers, Ph.D., Sc.D., Western Re-

serve University Schools of Medicine and Dentistry, Cleveland, Ohio. Floyd D. Ostrander, D.D.S., M.S., University of Michigan School of Dentistry, Ann Arbor, Mich. Charles Sheard, Ph.D., Sc.D., Mayo Foundation, University of Minnesota and Mayo Clinic, Rochester, Minn. Harold S. Smith, D.D.S., Chairman of the Council, Chicago, Ill. Donald A. Wallace, Ph.D., Secretary of the Council; Director of the A.D.A. Bureau of Chemistry, Chicago, Ill.

The following were present at all or part of the sessions on invitation of the Council:

Dr. George K. Anderson, Secretary of the Council on Foods and Nutrition, American Medical Association, Chicago, Ill. Mr. Howard Carter, Secretary of the Council on Physical Medicine, American Medical Association, Chicago, Ill. Dr. J. Roy Doty, Associate Chemist, A.D.A. Bureau of Chemistry, Chicago, Ill. Dr. A. O. Gruebbel, Secretary of the Council on Dental Health, American Dental Association, Chicago, Ill. Dr. R. P. Herwick, Chief, Drug Division, Food and Drug Administration, Washington, D. C. Dr. Harold Hillenbrand, Editor of the journals of the American Dental Association, Chicago, Ill. Mr. John J. Hollister, business manager, American Dental Association, Chicago, Ill. Dr. Lon W. Morrey, Director of the Bureau of Public Relations, American Dental Association, Chicago, Ill. Dr. H. W. Oppice, Trustee of the American Dental Association, Chicago, Ill. Dr. Harry B. Pinney, Secretary, American Dental Association, Chicago, Ill. Dr. Austin E. Smith, Secretary, Council on Pharmacy and Chemistry, American Medical Association, Chicago, Ill. Dr. H. B. Washburn, Trustee of the American Dental Association, Saint Paul, Minn.

During the past year, the Council has continued, through its work and its program of professional education, to emphasize the necessity and desirability of high standards for the composition and marketing of dental drugs and cosmetics. Conditions peculiar to war years have continued to demand extra work on the part of the Council members, and they have given unstintingly of their time and knowledge during this period. The Council particularly appreciates the efforts of its nondental members in this connection.

Following is a brief summary of some subjects discussed.

Devices and Related Products

Such items as toothbrushes and denture adhesives are receiving the attention of the Council. The Council voted to consider denture adhesives subject to a set of tentative requirements, which have been transmitted to the interested firms. It is planned to keep the profession informed with regard to developments on this particular class of products.

A great deal of material with regard to toothbrushes has been accumulated and digested by a Council referee during the past year. This material is now being worked into a report which will appear in the Council's section of a later issue of THE JOURNAL.

Fluorides

After a comprehensive discussion of the desirability or necessity of incorporation of fluorides in dentifrices and mouth washes for the control of dental caries, the Council adopted the following statement as its present attitude toward fluorides:

"In the light of presently available information, the Council has adopted the following statement: The Council on Dental Therapeutics of the American Dental Association is of the opinion that for the control of dental caries, the routine use by the dental profession or by the laity of foods, drugs, mouth washes, dentifrices and other preparations in which fluorine occurs naturally or to which fluorides have been added is not justified because of their unestablished value and their known potential deleterious effects from the systemic absorption of fluorides. The Council will continue to evaluate new data as they become available."

Dentifrices

The shortage of materials continues to be a major problem to manufacturers of dentifrices. The Bureau of Chemistry checks closely on the dentifrices accepted by the Council.

Revision of A.D.R.

Because of the great demand for copies of the tenth edition of Accepted Dental Remedies, which became available in August of 1944, and because of the restrictions that apply to paper and binding materials, the tenth edition was completely sold out before the first of the year. A second printing has also been exhausted.

The eleventh edition is now in press and copies should be available about August 15.

It was decided that certain products should be deleted from A.D.R. for lack of confirmation of earlier reports of their dental usefulness. The azo dyes and trichloroethylene were found to come within this category. Because brands of official narcotic drugs are already controlled adequately under the Federal Narcotic Act, it was voted to delete such brands from the eleventh edition of Accepted Dental Remedies.

Informative Articles

Since the 1944 meeting, the following informative articles have appeared in the Council's section of THE JOURNAL:

"Practical Significance of Abrasives in Dentifrices." Sidney Epstein, D.D.S., J.A.D.A. 31:400, March 1, 1944.

"Systemic Aspects of Diseases of Teeth and Oral Tissues." Lester W. Burket, M.D., J.A.D.A. 31:450, April 1, 1944.

"Anesthetics in Dental Practice." William Neff, M.D., J.A.D.A. 31:1244, September 1, 1944.

"Topical Medication." Edward C. Dobbs, D.D.S., J.A.D.A. 31:832, June 1, 1944.

"Penicillin Progress." Austin E. Smith, M.D., J.A.D.A., 31:1379, October 1, 1944.

Additional articles are planned and will appear in THE JOURNAL from time to time during the coming year.

Penicillin

More recently developed aspects of penicillin therapy, as well as newer knowledge of the chemical constitution of the various known types of penicillin, were discussed. The possibility that sensitivity to the drug may be an important factor in therapy was brought out.

The scientific background for dental use of penicillin has not yet developed to the stage where any routine application can be recommended. However, its dental use holds some interesting possibilities.

Professional Education

During the past year, representatives from the Council office gave talks before the junior and senior classes of almost all of the dental schools in the United States.

The secretary talked to six groups of practicing dentists. The response to these talks has been very encouraging, and it was decided that every effort should be made to continue them.

In 1943, the Board of Trustees of the American Dental Association adopted the following policy with regard to advertising and to commercial exhibits:

"Products coming within the scope of the Council on Dental Therapeutics of the American Dental Association must be acceptable to the Council to be advertised in any of the publications of the Association or to be exhibited at any of its meetings."

At present, twenty-six of the constituent societies and seven of the component societies have notified the Central Office that they are following a similar policy. The number of such societies is constantly increasing. Among the more recent additions to the list are Mary-

land, Maine, New York, Massachusetts and West Virginia.

Council Consultants

The Council acknowledges the services rendered during the past year by consultants. The assistance of qualified consultants is very valuable to the Council.

Appreciation

The Council wishes to express its gratitude and appreciation to those national, state and local society officers who have cooperated with it during the past year and also to the governing bodies of the American Dental Association for their continued support of the Council.

COMMITTEE ON LEGISLATION

ILLINOIS SUPREME COURT DECISION ON REVOCATION OF LICENSES

The licenses of four Illinois dentists were revoked by the Department of Registration and Education; and, in a decision dated May 23, 1945, the revocation of their licenses was sustained by the Illinois Supreme Court.

According to the evidence in the case, at various locations in the city of Chicago there were conducted so-called "AAA Health Centers." These "Health Centers" were occupied by the AAA Eye-Glass Company, AAA Dental Laboratories, Inc., and one or more dentists. Dr. Basford, a dentist, owned and managed the dental office in each of the health centers. Drs. Walker, Horwitz and Buerstetta, all of whom were licensed dentists, were employes of Basford, and each conducted a dental office in one of the health centers, under the direction and management of Basford. In each of the health centers, there was a central entrance or doorway with display windows on each side of the entrance. The window on one side was used for the display of glasses by the eye-glass company. The other window was used by AAA Dental Laboratories, Inc., for the display of dentures, pictures of dentures, pictures of smiling women and signs giving the prices of dentures. The AAA Dental Laboratories, Inc., also carried on an advertising campaign in the metropolitan press of Chicago. In each health center, a receptionist was employed jointly by the eye-glass company, AAA Dental Laboratories, Inc., and Basford, and all three contributed to her salary.

One of the duties of the receptionist for the AAA Dental Laboratories, Inc., was the sale of dentures and entering into contracts with the public for the sale of dentures. When a person entered one of these health centers in response to an ad or otherwise, the usual procedure was for the receptionist to take him into a booth called a salesroom. There samples of dentures were shown to the prospect, prices quoted and the advantages of the more expensive plates pointed out. After a sale was finally made and a contract for the purchase of the dentures entered into, the matter of procuring an impression by a licensed dentist was then suggested by the receptionist, who would then direct the buyer to a dentist on the premises for an impression, without any discussion on the subject. There is some controversy in the evidence as to whether there was any discussion on this subject, although the record justifies the conclusion that this was the practice followed in at least certain cases; though, the dentist asserted, the buyer was informed that an impression by a licensed dentist was required and further the buyer was told

that he could select his own dentist.

After the impression was obtained, the AAA Dental Laboratories, Inc., would send it to the AA Dental Laboratories, a partnership and a separate and distinct organization from the AAA Dental Laboratories, Inc. The partnership would then construct the denture. The dentures were not made by the corporation. They were made by the partnership. The denture was then delivered to the corporation and the dentist would fit and adjust it in the mouth of the patient. The money for both the denture and the impression was paid to the receptionist at the time that the sale was made, and she would give a receipt on behalf of the dentist for the impression and a receipt on behalf of the Dental Laboratories, Inc., for the denture purchases. The receptionist collected and handled all the money paid by the customer, or patient. The standard charge for the impression, which included fitting and adjusting, was $5. The prices of the dentures vary.

Dr. Basford testified that he could not give an estimate of how many impressions he took in a day, but he would take them as fast as the girls sold them. He further testified that he had nothing to do with the patients at all, that they were not his patients; that he takes the impressions for the AAA Laboratory, Incorporated because it needs them. He further testified that he did some dental work on his own account, not connected with the laboratory; that the fee of $5 for taking the impression is charged only to the patients of the AAA Laboratories, Inc., and that he made a higher charge to his own patients. Similar testimony was given by the other three dentists. The four dentists, in opposing the revocation of their licenses, contended that the law only required that the impression be taken by a dentist and that the manufacture and sale of the dentures after the impression has been taken by a licensed dentist is exempt from operation of the dental practice act and that such sales and deliveries are legal.

The Illinois Supreme Court referred to a previous decision involving the right of a laboratory to advertise, and called attention to the fact that in its previous decision it had said:

> [Dental laboratories] claim they have a constitutional right to advertise their business and sell their products to the public, subject only that the making of the impressions and the fitting and adjustment of the plates shall be made by a licensed dentist. It is obvious that if they were permitted to thus advertise their business, the practice of the profession of dentistry would, to a great degree, be subservient to the business of those engaged in the making of plates. It is well known that masses of the public do not comprehend or understand the skill that is necessary to the making of proper dentures and the proper charges to be made for such services. Such persons are often attracted by the advertisements of the quack and charlatan and seek his services. . . . If the restrictions of which appellants (dental laboratories) complain were removed, it would permit licensed dentists receiving patients referred to them by the dental laboratories to do indirectly what other provisions of the act prohibit them from doing directly.

The court further called attention to the fact that, in its previous decision, it had said that if the advertisement carried on by the dental laboratories was the medium which brought the patients to the health centers and they were then sent to the dentist's office, this would, as to its effect upon dental profession, be much the same as though he had come to the dentist's office in answer to an advertisement of the dentist, which is prohibited by the act. The facts clearly show, said the Supreme Court, that the AAA Dental Laboratories, Inc., a corporation, was unlawfully engaged in the practice of dentistry as defined in the dental practice act and that it advertises in violation of the provisions of that act.

The facts further show that the dentists were professionally engaged and associated with the said corporation in violation of the Act. The facts also show that the dentists were guilty of improper and unprofessional conduct in maintaining their offices and in engaging in the practice of dentistry on the premises where dentures and posters pertaining to dentistry were unlawfully displayed and exhibited in the front windows.

If the advertisement of the AAA Dental Laboratories, Inc., was the medium that brought the patients to the health centers and they were then sent to the dentists, the effect upon the dental profession would be the same as if the patients had come to the offices of the appellants as a result of like advertisements published by the dentists.

The record shows that the whole scheme was a deliberate effort to evade the restrictions on advertising, prescribed by the Dental Practice Act.—*George H. Fox, Secretary.*

NEWS OF DENTISTRY

Veterans to Get Preference in Purchase of Surplus Property

Veteran dental officers, with all of the other veterans of the present war, will be given special preference in the purchasing and pricing of surplus property. This was made clear May 29 with the issuance by the Surplus Property Board of Regulation No. 7, which permits veterans to acquire surplus property for enterprises having less than $50,000 in invested capital through the Smaller War Plants Corporation. Any veteran who served honorably in the armed forces after September 16, 1940 is eligible. The Smaller War Plants Corporation will be permitted to charge the veteran no greater price than the price charged by the disposal agency.

In a survey of dental officers recently completed by the War Service Committee of the American Dental Association, many indicated their desire for priority in the purchase of surplus dental property. The committee has been at work on this problem and the announcement by the Surplus Property Board is a definite sign of progress. Other important considerations, such as pricing and availability of equipment, and term payments will be taken up by the committee with the proper governmental agencies.

The text of the new regulation follows:

Text.—Definitions. (a) "Disposal agency" means any Government agency designated pursuant to the Surplus Property Act of 1944 to dispose of one or more classes of surplus property.

(b) "His own small business or professional enterprise" shall include any commercial, industrial, manufacturing, financial, service, legal, medical, dental, or other lawful enterprise (other than agricultural) having an invested capital not in excess of $50,000, which a veteran maintains or desires to establish: *Provided,* that he is or will be, directly or indirectly, the sole proprietor thereof or that no person or persons, other than other veterans, have or will have any proprietary interest in the enterprise, singly or together, directly or indirectly, in excess of 50 per cent of either the capital invested in such enterprise or of the gross profits or income thereof.

(c) "His own small agricultural enterprise" shall include any farming, fisheries, forestry, grazing, fruit-growing, livestock or poultry raising or other lawful enterprise (other than a business or professional enterprise) having an invested capital not in excess of $25,000, which a veteran maintains or desires

to establish: *Provided*, that he is, or will be, directly or indirectly, the sole proprietor thereof or that no person or persons other than other veterans, have or will have any proprietary interest in the enterprise, singly or together, directly or indirectly, in excess of 50 per cent of either the capital invested in such enterprise or of the gross profits or income thereof.

(d) "Surplus property" means any property which has been determined to be surplus to the needs and responsibilities of the owning agency in accordance with the Surplus Property Act of 1944.

(e) "Veteran" means any person who served in the active military or naval service of the United States during the present war, or any person who served in the active military or naval service of the United States on or after September 16, 1940, and prior to the termination of the present war, and who has been discharged or released therefrom under honorable conditions.

Limitation of application; property excepted. This part shall apply only to property within the United States, its territories or possessions. It shall not apply to real property, nor to aircraft and parts peculiar to aircraft or any classes of property designated in section 19 of the Surplus Property Act of 1944. Whenever reference is made in this part to property useful to establish or maintain a small business, professional or agricultural enterprise, such property shall not include any property to be resold, with or without reprocessing or refabrication, in the regular course of business of such enterprise.

Veteran's application for property useful in business or professional enterprises. Any veteran desiring to exercise the preference hereby granted in the purchase of surplus property useful to establish or maintain his own small business or professional enterprise shall file an application for such property with the district office of the Smaller War Plants Corporation for the locality within which he maintains or intends to establish such enterprise.

Purchase by Smaller War Plants Corporation of property useful in business or professional enterprises. The Smaller War Plants Corporation will exercise its priority right in the manner and to the extent provided in Part 8302[1] and any amendments thereof, to purchase from the appropriate disposal agency for resale to the veteran such property as he may apply for which in its judgment is required to preserve or strengthen the competitive position of small enterprise. In forming such judgment, the Smaller War Plants Corporation will take into account whether the property will be useful in and will aid the veteran to establish or maintain his own small enterprise and whether business conditions and other economic factors affecting the locality within which the veteran maintains or desires to establish such enterprise render the success thereof reasonably probable. Smaller War Plants Corporation will report to the Surplus Property Board all instances in which the veteran's application is rejected in whole or in part and the reasons for such rejection. . . .

Pricing. In selling surplus property to the Smaller War Plants Corporation for resale to a veteran hereunder, disposal agencies shall comply with applicable regulations of the Office of Price Administration, but in no case shall charge a price which is greater than the cost of acquisition thereof to the Government, less appropriate allowances for depreciation, obsolescence, wear and tear, and such other factors as may relate to the condition or utility of the property. The Smaller War Plants Corporation will charge the veteran no greater price than the price charged by the disposal agency: *Provided, however,* that the Smaller War Plants Corporation may increase such price by the actual cost of delivering the property to the veteran if such cost is not included in the disposal agency's price.

Consignments directly to veterans by disposal agencies. Upon the request of the Smaller War Plants Corporation, disposal agencies shall forward directly to the veteran property purchased hereunder for resale to him.

Limit on purchases for resale to veterans. The Smaller War Plants Corporation shall not purchase for resale to any one veteran hereunder surplus property in excess of $2,500 as determined by the disposal agencies' sales prices.

Consolidation of orders. To the extent feasible, the Smaller War Plants Corporation shall consolidate its orders hereunder for like items of property and shall submit to the disposal agencies consolidated orders for the largest quantity of like items that the circumstances permit.

1. SPB Reg. 2 (10 F.R. 5104).

Amendment or repeal. This part shall be subject to amendment or repeal by the Surplus Property Board by any regulation or order of the Board duly published in the *Federal Register*.

This part shall become effective July 1, 1945.

No Large Release of Dental Officers Before End of 1945

Substantial releases of Army Medical Department personnel, which includes the members of the dental, medical and nursing corps, will not take place before the latter part of this year, Surg. Gen. Norman T. Kirk said May 31 in announcing a policy on discharges in conformity with War Department procedure. This is due to the fact that the peak of the medical department's activities will not be reached until fall.

In formulating the policy, consideration was given to civilian needs for health care without weakening military needs. Other factors considered were the length of time necessary for personnel to complete their work in the Mediterranean and European Theaters and return to the United States; replacement of medical department personnel in active theaters by those who have not had overseas duty; necessity for the maintenance of a high standard of medical care; the heavy load of patients in the United States; evacuation of the sick and wounded from Europe in the next ninety days, and continuing medical service in the Pacific.

The policy for the officers of the Dental and Medical Corps is as follows:

(*a*) Officers whose services are essential to military necessity will not be separated from the service.

(*b*) Officers above 50 years of age whose specialist qualifications are not needed within the Army will receive high preferential priority for release from active duty.

(*c*) Adjusted service ratings will be utilized as a definite guide in determining those who are to be separated.

Capt. C. Raymond Wells, USNR, Receives New Naval Assignment

Capt. C. Raymond Wells (DC), USNR, has completed a four-year tour of active duty as Chief Dental Officer, Selective Service System, Washington, D. C. At his own request, the Navy Department has ordered him to duty as the senior dental officer, Dispensary, Naval Receiving Ship, Flushing Ave., Brooklyn, N. Y.

During his assignment in Washington, Captain Wells took an active part in many of the problems created by the war in regard to the commissioning of dental officers and the deferment of dental students. He also served in 1943-1944 as President of the American Dental Association.

Captain Wells should now be addressed at Suite 507-509, 1 DeKalb Ave., Brooklyn 1, N. Y.

Right to Command Bill for Dentists Passed by Senate

To remove the limitation now existing on the right of Army dental officers to exercise command, the Senate in May passed S. 916, which places dental officers on a plane with other officers of the medical department. The bill is also intended to further morale and to increase discipline in the control of enlisted men.

Maynard K. Hine Appointed Dean at Indiana Dental School

The appointment of Maynard K. Hine as dean of the Indiana University Dental School has been announced by university officials. He will succeed William H. Crawford, recently appointed dean of the School of Dentistry, University of Michigan. Dr. Hine, who will take office July 1, has been professor of periodontia and histopathology at the Indiana University Dental

Maynard K. Hine, recently appointed dean at Indiana University Dental School.

School since 1944. He was graduated from the University of Illinois College of Dentistry in 1930 and received the degree of master of science from the university in 1932. Upon graduation, he became an instructor at the University of Illinois Dental School, remaining on the faculty of the university until he assumed the professorship at Indiana University in 1944. In 1934, Dr. Hine received the Rockefeller Fellowship in Dentistry and, in 1935, the Carnegie Fellowship, both at the University of Rochester School of Medicine and Dentistry.

Dental Alumni Attack Merger of Faculties at Columbia U.

The Association of Dental Alumni of Columbia University, at its twentieth annual spring meeting May 27 in New York City, attacked the recent merger of Columbia's medical and dental faculties.* This was the first formal reply to the action by the university's president, Nicholas Murray Butler, and the board of trustees, which made the dental school part of the medical faculty of the College of Physicians and Surgeons.

The medical-dental faculty merger, announced last March, said that the dental school, now known as the School of Dental and Oral Surgery of Columbia University, is to be under the jurisdiction of the medical faculty beginning June 30.

In an address before a large gathering of alumni, Donald B. Waugh, retiring president of the association, asserted that the dental school would, under the merger, lose both its identity and its autonomy. He also said that the merger action had been taken without full knowledge of every detail by members of the dental faculty.

War Service Committee Asks for Dentists on State G.I. Committees

The War Service and Postwar Planning Committee of the American Dental Association has recently written to the state governors requesting the appointment of dentists to state advisory committees to insure that provisions of the G.I. Bill of Rights, as they apply to dentistry, may be efficiently administered. C. Willard Camalier, chairman of the committee, advised the governors that "dental societies and schools of your state will be pleased to consult with you in regard to the appointment of the dental members of the proposed committee, and in any other manner to aid you in the successful administration of the provisions of the aforementioned Act."

Dr. Camalier assured the governors that all facilities of the committee and the Council on Dental Education of the American Dental Association would be placed at their disposal.

*See J.A.D.A., 32:356, March 1, 1945.

Survey Shows Large Number of Recent Graduates Enter Services

Most of the recent graduates of the dental schools of the country are entering the armed services in spite of the discontinuance of the Army Specialized Training Program, according to a recent survey conducted by the War Service Committee, C. Willard Camalier, chairman. The study was made to ascertain whether existing policies on granting commissions to new graduates prevented them from entering the armed services even if physical requirements could be met.

The results of the survey clearly indicate that only a very few recent graduates have entered private practice. In eleven dental schools, with 397 graduates in the period surveyed, 331, or 83 per cent, received commissions in either the Army or the Navy. About 10 per cent secured teaching positions and internships, while only twenty-three graduates, or less than 6 per cent, entered private practice. A number of those who entered private practice were disqualified from receiving commissions by sex, age or physical disability.

"In view of this study," Dr. Camalier said, "it is not accurate to say that students who have been trained at government expense have been released into private practice. The survey shows clearly that a large majority of recent graduates, many of whom received partial subsidy during their period of education, are now serving their country in a military capacity. The discharge of 250 dental graduates of the June 1944 classes trained under the ASTP created a somewhat difficult situation at the time, but this was largely corrected by the action of the men themselves in securing commissions in the Navy or in other governmental agencies involved in the war. The close cooperation between Procurement and Assignment and the Selective Service System was effective in correcting almost all inequalities."

Dentist Elected to Board of American Cancer Society

Hamilton B. G. Robinson, professor of dentistry, Ohio State University College of Dentistry, was elected unanimously to the Professional Board of the American Cancer Society March 4, the society has announced. The election of Dr. Robinson, the only dentist on the board, constitutes the American Cancer Society's official recognition of the importance of oral cancer and provides representation for dentistry in the field of cancer research.

Two Dental Officers Receive New Assignments

The Office of the Surgeon General has announced the assignment of Capt. Julius C. Sexson, Worthington, Ind., to the Dental Division of the Surgeon General's Office. Captain Sexson was stationed formerly at the Army Air Base, Santa Ana, Calif. Capt. Perry W. Bascom, New Brunswick, N. J., formerly of the Dental Division, has been assigned to the 307th General Hospital.

Cincinnati Society Initiates "Dentist-Boy" Banquet

An experiment to arouse the interest of young men in the study of dentistry was conducted by the Cincinnati Dental Society in the form of a "Dentist-Boy" banquet held April 10. More than 150 boys were guests of the society members, who gave a program designed to present dentistry as a field of opportunity and usefulness to young men. The program committee, under the chairmanship of S. A. Schmid, presented talks in the interest of dentistry by Holly C. Jarvis, president of the state society; Carlos H. Schott, Trustee of the American Dental Association; Wendell D. Postle, dean,

Dentist-Boy dinner. Left to right (seated): Holly C. Jarvis, president, Ohio State Dental Society; Carlos H. Schott, Trustee, American Dental Association; Bland L. Stradley, vice president, Ohio State University; (standing): Les Horvath, senior dental student, All-American halfback, Ohio State University; Floyd E. Lytle, president, Cincinnati Dental Society.

School of Dentistry, Ohio State University; P. E. Blackerby, Jr., dean, College of Dentistry, University of Louisville; W. L. Wylie, dean, School of Dentistry, Western Reserve University; Floyd E. Lytle, president of the local society, and Bland L. Stradley, vice president of Ohio State University. The banquet, the first of its kind, will be staged annually by the society.

Dental Officers Now Assigned to Army Hospital Ships

Every Army hospital ship has at least one dental officer assigned to its professional staff, whether it is bringing wounded home, transferring patients from one theater to another or supporting an amphibious landing operation.

The larger hospital ships carrying 900 to 1,500 bed-patients have a dental staff headed by a lieutenant colonel. On the 1,500-bed ships, this staff consists of a lieutenant colonel who is a general dentist, a major who is an oral surgeon, and two captains or first lieutenants who are general dentists. The highest ranking dental officer on hospital ships, which carry from 500 to 800 bed patients, is a major who is an oral surgeon, while a captain or first lieutenant who is a general dentist is assigned the dental responsibilities on the smaller 200-bed to 400-bed hospital ships.

Chicago Announces Plans for Course in Economics

A study course in dental socio-economics will be presented jointly by the Chicago Dental Society and the University of Chicago this fall, according to plans announced by the Study Course Committee, Lon W. Morrey, chairman. The study program will consist of eight weekly sessions from October 10 to November 28. Lecturers from the University of Chicago and various dental societies will conduct the sessions, with part of each meeting to be devoted to audience participation. The names of the speakers and the exact location of the meetings will be announced later.

The tentative subjects of the eight sessions are as follows:

"Dentists in a Changing Democracy"; "The Health of the American People";

Dentist-Boy dinner. Left to right: Les Horvath, All-American halfback, Ohio State University; Floyd E. Lytle, president, Cincinnati Dental Society; S. A. Schmid, president elect, Cincinnati Dental Society.

Members of the American Association of Dental Examiners.

"The Ability to Pay for Dental and Medical Care"; "Plans for Dental and Medical Care"; "Types of Group Action in Organization in Medicine and Dentistry"; "Organization Through the Action of Consumer Groups—Receivers of Medical and Dental Care"; "The Profession and Public Policy Concerning the Health Services," and "The Formulation of Public Policy Concerning the Health Service."

Tickets for the series of eight sessions will be $9 and may be obtained through the Chicago Dental Society, 30 North Michigan Ave., Chicago, Ill.

Former A.D.A. Liaison Officer Assigned to Hospital in India

Lt. Col. Kenneth R. Cofield, former liaison officer to the American Dental Association, has been assigned to the 18th General Hospital in India as chief of dental service. Colonel Cofield was appointed liaison officer and consultant to the Office of Procurement and Assignment in June 1942. He resigned his post as liaison officer in March 1945 to accept duty overseas.

Horace Wells Centenary Commemorated in Peru

Graduating exercises commemorating Horace Wells' discovery of the principle of anesthesia were held December 11 by the dental school of San Marcos University, Lima, Peru. Dr. José M. Garcia Bedoya, dean of the dental faculty, addressed the graduates. J. C. White, of the United States Embassy, also took part in the program.

Governor Proclaims Massachusetts Health Week

Maurice J. Tobin, governor, proclaimed May 7-12 as Massachusetts Health Week, and designated Tuesday, May 8, as "Dental Day." Stephen P. Mallet, president-elect of the Massachusetts State Dental Society and chairman of "Dental Day," spoke in Boston at a luncheon, which was the highlight of the day.

CASES AND COMMENTS

Aiding the Relief Fund

To the Editor: It has occurred to me that 1945 may prove to be a nonconvention year and that the states might make of it a year of good will in dentistry. There are thousands of us who regularly attend two or more dental meetings, the cost of which represents a goodly sum to each one attending. No doubt, there are many states whose relief fund is small, and if each member who attends dental meetings regularly, together with those who do not, would contribute to his state relief fund in a substantial manner, it would be impossible for any member or his family to suffer want. As we know, such contributions are deductible from income reports.

In backing this suggestion, I am going to contribute to the Arkansas Dental Relief Fund in 1945 the sum of $100. This is a good year to increase our state funds in the interest of our less fortunate colleagues.

Millard D. Gibbs,
Hot Springs, Ark.

A National Health Program

To the Editor: I read with interest a statement in the April 1, 1945 issue of THE JOURNAL by a Joint Committee of Three A.D.A. Committees, dealings with the National Program for Dental Health (pp. 498-503).

After a review of the situation which the profession faces in regard to dental health and dental diseases in the nation, the statement outlines the platform of research, health education and dental care as the basis of its program. These are all needed, and under one or another of these headings can properly be placed any activity directly aimed at improving national dental health. I am struck, however, by the repetition of this theme appearing so often in recent years, but with so little amplification as to methods.

Then I note in the conclusions the following statements, which also have appeared before: "This program is not revolutionary: it is evolutionary. It makes use of existing mechanisms, 'strengthening and improving them where there is need.... It is not prohibitively nor legislatively impracticable."

These statements are put forth as though they were self-evident truths and desiderata. I think that we may well question them. Take the first statement with its assumption that a revolutionary program would be harmful. That does not necessarily follow. Many revolutions have resulted in highly desirable reforms and improvements in the lot of mankind. The harm associated with some of the highly publicized revolutions has often resulted from unwise resistance to the needed reforms rather than from any socially undesirable features of the changes themselves; and when pent-up pressures burst their bounds, people get hurt, but that need not happen if desirable changes are not opposed.

We then come to the second statement that the program makes use of "existing mechanisms," with the implication that these are the best possible devices or, at least, that they ought not be changed. What, I ask, is sacrosanct about these existing mechanisms? Are they necessarily the best simply because they are in existence? If by "existing mechanisms" is meant dental care in the individual private office on the usual fee for service basis, we may, I think, well question the implication that existing mechanisms offer the best means of providing regular dental care for the 75 to 80 per cent of people not now receiving it. Is there an effort here to bring more people to the private office and a belief that this offers the best means of meeting the situation? Organized medicine is making the same effort. Yet many leaders of medical thought, those experienced in the actual provision of medical care to the underprivileged, agree that group practice, in one form or another, provides the best medical care. Is it not possible that the same thing applies to dental care?

Let us study existing mechanisms by in-

quiring as to how they have met some of the recognized problems. First, let us look at dentist distribution. The tendency of dentists to set up practice in cities instead of balancing between cities and smaller communities indicates that there is something wrong with existing mechanisms in that regard. The problem is obviously economic, and we cannot blame dentists for wanting to make a living. But people in the country have toothache the same as in the city. However, even under present conditions, not *all* people in the city get *all* the dental care they should have. Economic again, in large part.

One of the results of this lack of dental care has been, first, a high rejection rate in the draft on account of dental defects and, when this was discovered, a complete abolition of dental requirements in physical examination for the Armed Forces (even the Navy with its initially higher standards had to give in). This resulted in drafting of one third of the dentists of the nation into the Services. And what did these 22,000 dentists do, once they were in the Dental Corps? Protect the troops against new dental disorders? For the most part, no. They had to rehabilitate wrecked mouths so that soldiers and sailors could chew their food and be able to endure the rigors of military campaigns. Can we expect to prevent a repetition of this in a possible World War III by continuing to depend on existing mechanisms?

Our leaders say that this can all be prevented in the future. How? By spending more money to turn out more dentists to practice in private offices. And this brings us to the third statement quoted from the committee statement, that the proposed program is not prohibitively expensive. If practice in the individual office is more expensive than practice in a clinic, with its saving in overhead (to say nothing of other advantages), to choose the existing mechanism in locations, such as cities, where clinics can well be established, is to choose the more expensive mechanism; a course which it is difficult to defend if it is claimed that it is not "prohibitively" expensive.

Reverting again to existing mechanisms: These are based on the law of supply and demand and under this law prosthetic dentistry, the replacement of teeth lost through disease, is more profitable than operative dentistry, the filling of teeth to keep them in the mouth. How can we expect, if we continue existing mechanisms, to induce dentists to devote a large amount of time to children's care, which is largely operative dentistry, and which the Council on Dental Health rightly advocates as the foundation of the national dental health program? More could be said regarding children's dental care and present-day dental practice, but the point need not be labored.

I end on a note of interrogation. Is it not time to think of planning new ways to meet the national dental problem?

John Oppie McCall
422 E. 72nd St.
New York City

Checking and Pitting in Acrylic Resins

HENRY KNOWLES, D.D.S., Falls Church, Va.

One of the most frequent difficulties to be encountered in processing acrylic resin dentures is the checking and pitting of the material. Both of these can be avoided through simple procedures that have demonstrated their effectiveness in many trials.

In order to prevent pitting, the plastic resin is pressed firmly over the surfaces to be covered by the denture and the material smoothed with the fingers. It is then scored thoroughly in order to permit the gases to escape. When the flask is opened after testing, it is advisable to score the material once more.

In order to prevent checking of the teeth, it is necessary merely to discard the bench press and to close the flask only with the pressure that can be achieved manually. If the material has been mixed properly, this pressure seems to be sufficient, and undue pressure in the closure of the flask is avoided.

When the foregoing procedure has proved its effectiveness, and it will, bench presses will make a useful contribution to the war effort.

Coating for Plaster Models

J. L. ELPHINSTONE, Aberdeen, Scotland

A 5 per cent solution of zinc oxide or

magnesium sulfate applied to a plaster model before it is coated with sodium silicate (water glass) will produce a smoother surface. A saturated solution of common alum (aluminum and potassium sulfate) can also be used for the preliminary coating.

Fracture of the Maxilla During Simple Single Tooth Extraction

ROBERT B. SLOANE,* D.D.S., Galveston, Texas

REPORT OF CASE

History.—A soldier, aged 22, on routine survey, presented a badly carious upper right first molar.

Examination.—The patient was in normal health and was well developed.

Operation.—On excavation of the cavity in the affected tooth, an exposed pulp was revealed. The patient was then prepared for extraction and was anesthetized. Molar forceps were applied and the tooth was gently luxated. On application of slight buccolingual pressure, the upper right second molar and the tuberosity were also seen to move. The upper right third molar was missing. With the forceps still in place and with a slight buccolingual movement, the palatal area adjacent to the roots of both teeth and the buccal plate were palpated. There was definite movement of the whole process of the maxilla from the right first molar back to and including the tuberosity. A sharp, narrow elevator was

Fig. 1.—Bone fragments.

then used to try to separate the upper right first molar from its bony attachment, without success.

An incision was then made in the buccal mucous membrane just in front of the first molar and, with a periosteal elevator, the tissue was reflected. By careful dissection, the entire process, consisting of the upper right first and second molars and the tuberosity, was removed. The wound and the fragment were then cleaned and examined. The intact schneiderian membrane of the antrum was revealed by the operation. The roots of the teeth, covered by a paper-thin

Fig. 2.—Mesial superior view; showing roots with thin bony covering forming antrum floor.

layer of bone, had formed the floor of the antrum. The sharp edges of the bone were then trimmed off and the flaps sutured tightly into position.

Course and Treatment.—The patient was hospitalized for postoperative observation. There was slight bleeding from the wound for about six hours. Some edema and tenderness were present at the site of operation for two days. Otherwise, the patient felt well.

After a week in the hospital, he was discharged, and returned to duty. Two weeks after the operation, the sutures that had not already sloughed out were removed. There were no clinical indications of a sinus tract into the antrum and the patient was entirely comfortable.

Comment.—A roentgenogram of the fragment showed, in my opinion, nothing suggesting the complications that followed operation. The exposed pulp was easily recognized and there appeared to be a clearly

*Captain (DC) U. S. Army.

Fig. 3.—Buccal view.

defined periodontal membrane. The bone fragment itself showed no separation between the roots of the teeth and the paper-thin bony covering. In spite of the care taken in extracting a tooth, a rare, "freak" accident of this kind is, in my opinion, entirely unpredictable.

Severe Periodontoclasia

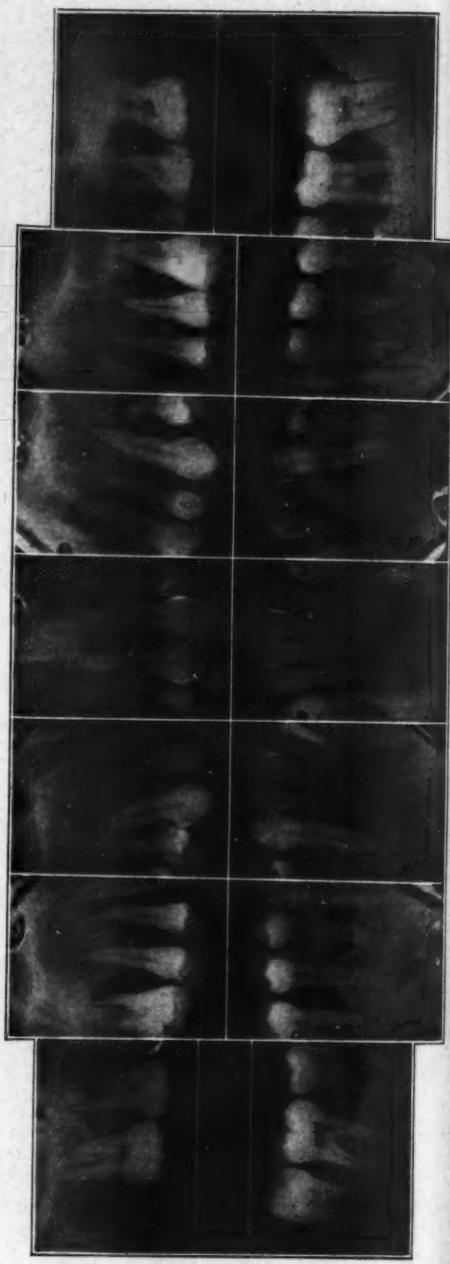
EDWARD L. HILLS,* Camp Stoneman, Calif.

THE accompanying roentgenograms show a severe periodontoclasia in a Negro soldier, aged 19 years 11 months, the case being of special interest because of the man's age. The general appearance was good, the patient being about 5 feet 7 inches tall, of medium build and of normal posture and bearing.

His appetite was good, but he stated that at times he did not feel well. The blood and urine were normal and there was no history of any unusual diseases or of any medication.

The teeth themselves were well calcified and without caries. The arches were normal and the occlusion was good, but the gingivae were inflamed and detached, with deep pocket formation.

The patient had an older sister and two younger brothers who, he believed, had good teeth.



Severe periodontoclasia.

*First lieutenant (DC) U. S. Army.

Cyst Involving Cuspid Tooth

IRVING SCHUMAN, D.D.S., Albany, N. Y.

A girl, aged 17, well developed and with a full complement of noncarious teeth in normal occlusion, seen January 20, 1944, complained of a swelling in the lower left bicuspid region. (Fig. 1.) January 25, the swelling had subsided and a two-crowned first bicuspid was extracted and the surrounding cystic tissue was enucleated. (Fig. 2.) March 3, x-ray films of the area revealed healing. (Fig. 3.) Recovery was uneventful.

112 North Pearl Street.

Fig. 1.—Swelling due to cyst.

Fig. 2.—Extracted tooth.

Fig. 3.—Area after extraction.

Fourth Molar

WILLIAM A. ROSENFIELD,* D.M.D., San Francisco, Calif.

Having read the article by Kleit in the March 1944 JOURNAL, mentioning "so-called fourth molars," I am presenting herewith a roentgenogram from the case of a soldier, aged 20, showing such an anomaly. There was a complaint of pain in the lower left third molar area and, on roentgenographic examination, a fourth molar was revealed. Both impacted teeth were removed under local anesthesia, with no complications. The fourth molar was shaped like an upper molar with a perfectly formed "oblique ridge."

Fourth molar (impacted).

Supernumerary Bicuspid

T. L. BRADSHAW, D.D.S., Lincoln, Nebr.

The case illustrated in the accompanying x-ray film is similar to that reported by Kleit in the March 1944 issue of THE JOURNAL, that of an impacted lower bicuspid.

Impacted bicuspid.

The patient, a priest, aged 35, gave no evidence of any unusual condition in the mouth, and there was no pain or disturbance that could be attributed to the presence of the impacted tooth.

501 North Twenty-Seventh Street.

*Captain (DC) U. S. Army.

Use of a Removable Sliding Device

JOSEPH M. MURPHY, D.D.S., and EDWARD KLEIN,* D.D.S., New York, N. Y.

ONE type of irregularity often met in orthodontic practice is that of the malposed cuspid tooth. Usually, this is a unilateral Class I case with the posterior segment of the opposing side having a forward drift and a resulting crowding of the cuspid. This condition is very noticeable and the cause of much annoyance to the patient.

We have used fixed appliances with intermaxillary elastics for correcting this malformation with success. From experience with several cases, however, we have concluded that the removable appliance is the mechanism of choice, for the following reasons:

1. The tactics of movement are more easily controlled.

2. The fixed device is more difficult to insert and not so expeditiously repaired, since, in the event of a band loosening or a wire breaking, the entire appliance must be removed and recemented.

3. Oral cleanliness is more easily maintained.

4. At the age that this condition appears, the young patient is more conscious of his appearance. This appliance offers the most in esthetic values. . .

Using all the anterior teeth and posterior teeth of the opposite side as anchorage, we construct a sliding mechanism on the segment to be moved. (Fig. 1.) By means of rubber bands attached to hooks, one on the anterior part of the movable unit (a) and the other on the posterior part of the fixed unit (b), pressure is exerted on the segment to be moved (c). It is well to use a single rubber band at first, then two or more later if necessary. On short teeth, it may be necessary to insert molar bands with spurs to help retain the mechanism in place.

The sliding rod D and the channel E attached to the anchorage are constructed of 15 gage half-round material in steel or 14 gage in gold. The channel should be three-fourths as long as the sliding rod as a strengthening factor. In Figure 2, the wire is exposed, to delineate more clearly the appliance and tactics of movement. We have

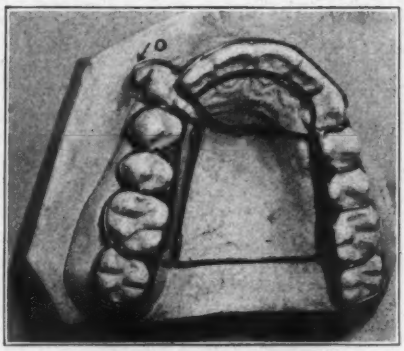


Fig. 1.—Sliding mechanism.

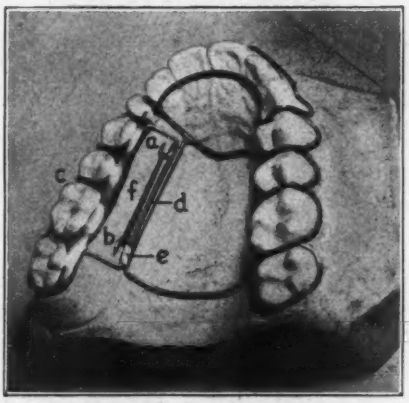


Fig. 2.—Wire exposed to delineate appliance.

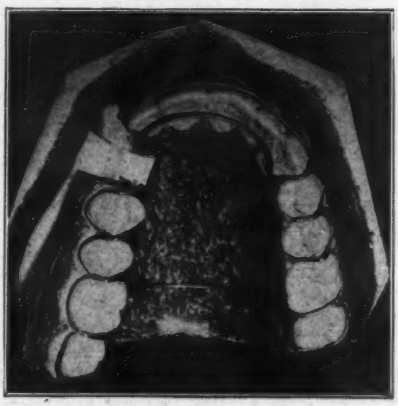


Fig. 3.—Teeth held in position by solder.

*Research associate in radiology, New York University, College of Dentistry.

found half-round wire more efficient than round because it makes for better control and tends to eliminate side roll.

As the pressure of the rubber bands moves the segment posteriorly, the channel is gradually cut away to permit the posterior movement to continue. In addition, the channel should be inclined buccally toward the distal aspect or parallel to the buccal cusps of the corresponding lower teeth. This prevents the moving teeth from being pulled out of line and assists in securing proper intercuspation.

The main body wire should be sufficiently distant from the vault to prevent the pressure of the elastics from forcing it into the tissues.

When moved the desired distance, the teeth are held in position by placing a drop of solder on the rod to fix it to the channel. (Fig. 3.)

Pressure is now exerted on the auxiliary spring wire and the cuspid is moved to its correct position. Often, this step is unnecessary, as the cuspid frequently assumes a normal position when the space is provided.

There are several variations in the use of this appliance, which may be worked out by the operator from experience.

Figures 4 and 5 show an appliance with a horseshoe body wire. It is well to wind some wire around the parts at the junction (x) before soldering, as the stress is greatest at this point.

Figure 6 shows the progress of a case; g, at the start of treatment, r, five months later and s, seven months later.

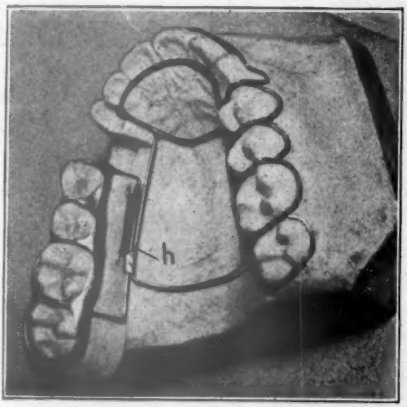


Fig. 4.—Appliance with horseshoe body wire.

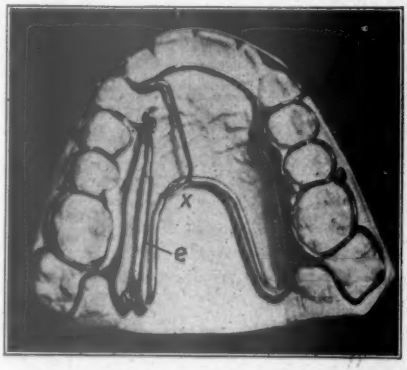


Fig. 5.—Appliance with horseshoe body wire.

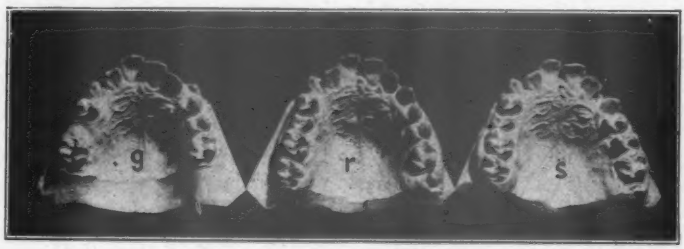


Fig. 6.—Progress of case.

DEATHS

Acker, B. H., Longview, Texas; Vanderbilt University, School of Dentistry, 1914; died April 7.

Anderson, R. L., Orlando, Fla.; Southern Dental College, Atlanta, 1906; died April 18; aged 68.

Bailey, Frank P., Milton, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1900; died April 3; aged 74.

Barker, Horace E., Brooklyn, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1904; died April 28.

Barnes, Van F., Glenwood, Iowa; State University of Iowa, College of Dentistry, 1918; died January 30; aged 50.

Beale, John C. C., Philadelphia, Pa.; University of Maryland; School of Dentistry and the Baltimore College of Dental Surgery, 1892; died April 26; aged 74.

Beeckel, Nelson A., Detroit, Mich.; died April 27; aged 49.

Beshoar, John, Trinidad, Colo.; Western Dental College, Kansas City, 1905; died May 14; aged 60.

Bingaman, William K., Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1918; died May 29; aged 53.

Birnberg, Ansel M., Los Angeles, Calif.; University of Minnesota, College of Dentistry, 1907; died May 10; aged 60.

Bloom, Phillip H., Memphis, Tenn.; University of Tennessee, College of Dentistry; died April 17; aged 35.

Blourft, H. B., Sedalia, Mo.; Washington University School of Dentistry, 1911; died April 8.

Bobrov, Sol A., Ossining, N. Y.; killed in action March 22 in the Southwest Pacific. Dr. Bobrov was a captain in the U. S. Army Dental Corps.

Boucher, Charles Edward, Springvale, Me.; died May 7; aged 71.

Brown, Mark D., Beresford, S. D.; State University of Iowa, College of Dentistry, 1906; died April 19; aged 63.

Buchanan, William, Trenton, N. J.; Medico-Chirurgical College of Philadelphia, Department of Dentistry, 1906; died April 27; aged 62.

Buggy, Vincent T., Philadelphia, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1918; died May 3; aged 48.

Burrows, William, Philadelphia, Pa.; died May 7.

Carmichael, E. A., Los Angeles, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1919; died April 18.

Carson, E. A., Corbin, Ky.; University of Louisville, School of Dentistry, 1901; died April 23; aged 64.

Cone, Nathan, Washington, D. C.; George Washington University, Dental Department, 1920; died April 25; aged 51.

Couch, Edgar H., West Lafayette, Ohio; died May 1; aged 48.

Covert, Frederick Lee, Lansing, Mich.; Detroit College of Medicine, Dental Department, 1909; died April 10; aged 65.

Crandell, U. G., Poplar Bluff, Mo.; died in April; aged 74.

Cretors, Charles R., Des Moines, Iowa; Chicago College of Dental Surgery, Dental Department of Loyola University, 1901; died February 26; aged 72.

Crist, M. C., Atlanta, Ga.; Southern Dental College, Atlanta, 1899; died March 20; aged 80.

Decker, John H., Berkeley, Calif.; died April 17; aged 85.

Dencer, Phillip H., Salem, Ore.; died April 18.

Dexter, J. V., Detroit Lakes, Minn.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1901; died May 4; aged 69.

Dulaigh, Dwight W., Dorchester, Nebr.; Omaha Dental College, Dental Department of the University of Omaha, 1903; died March 2; aged 68.

Finley, Lionel H., West Lake Weir, Fla.; the New York College of Dentistry, 1883; died recently; aged 85.

Fintz, Morris M., Philadelphia, Pa.; Pennsylvania College of Dental Surgery, 1909; died May 24; aged 59.

Fortgang, Joseph, Los Angeles, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1914; died March 24.

Frederick, H. A., San Francisco, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1899; died recently.

Frink, Bascom L., Asheville, N. C.; Atlanta Dental College, 1916; died April 2; aged 52.

Garland, Forrest A., Portsmouth, N. H.; died April 17; aged 70.

Garrett, Fred M., Pasadena, Calif.; Kansas City Dental College, 1918; died April 12; aged 52.

Gibson, Barney McCullough, Monte Vista, Colo.; Northwestern College of Dental Surgery, Chicago, 1910; died April 10; aged 64.

Gillespie, L. D., Burnsville, N. C.; died April 22; aged 88.

Gould, Fred C., Sioux City, Iowa; Pennsylvania College of Dental Surgery, 1886; died January 26; aged 81.

Grove, William A., Tipton, Iowa; Northwestern University Dental School, 1892; died April 12; aged 87.

Hansell, G. Grier, Philadelphia, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1898; died April 17; aged 69.

Harris, Andrew J., Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1898; died April 24.

Hewitt, Henry G., Santa Rosa, Calif.; died May 15.

Hurd, Harry A., Des Moines, Iowa; National University, College of Dentistry, Philippine Islands, 1898; died April 10; aged 68.

Kamen, Paul, Queens, N. Y.; Columbia University School of Dental and Oral Surgery, 1941; killed in action in Germany April 20; aged 29. Dr. Kamen was a captain in the U. S. Army Dental Corps.

Katzin, Robert, Newark, N. J.; died May 14; aged 24.

King, Elbridge D., Boston, Mass.; Harvard University Dental School, 1899; died March 5; aged 72.

Kisner, Roy M., San Antonio, Texas; Northwestern University Dental School, 1916; died April 20; aged 53.

Lewkowicz, Isadore H., Atlantic City, N. J.; died April 12; aged 70.

Little, Ralph A., Asheville, N. C.; Atlanta Dental College, 1905; died May 6; aged 58.

Logan, Clifford T., Omaha, Nebr.; Creighton University, College of Dentistry, 1923; died March 7; aged 47.

Love, Frank Norris, San Francisco, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1899; died February 1.

McCarthy, William J., Chicago, Ill.; died May 13.

McCormack, Charles V., Chicago, Ill.; Baltimore College of Dental Surgery, 1909; died May 12; aged 62.

McNutt, Robert B., New York, N. Y.; College of Dentistry, University of California, 1896; died May 15; aged 77.

Mack, William F., Los Angeles, Calif.; died March 30; aged 72.

Macy, William C., New Bedford, Mass.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1899; died March 24; aged 70.

Margolis, Harry J., Newark, N. J.; College of Jersey City, Department of Dentistry, 1917; died April 20; aged 60.

Marsteller, Ambler A., Norfolk, Va.; George Washington University, Dental Department, 1905; died May 8.

Mercille, Joseph M., Haverhill, Mass.; Tufts College Dental School, 1915; died March 30; aged 55.

Merrigan, William H., Brooklyn, N. Y.; Temple University School of Dentistry, 1895; died May 11.

Miller, J. E., Glenwood Springs, Colo.; died April 18; aged 88.

Nertney, Edward, La Salle, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1910; died April 5.

Newman, Otis M., Aurora, Nebr.; State University of Iowa, College of Dentistry; died March 22; aged 70.

Northup, George A., Poughkeepsie, N. Y.; University of Buffalo, School of Dentistry, 1898; died May 14; aged 68.

Oldaker, Leroy J., Exira, Iowa; State University of Iowa, College of Dentistry, 1900; died April 23; aged 71.

Park, M. M., Toledo, Ohio; University of Michigan, College of Dental Surgery, 1891; died May 10; aged 80.

Pearce, W. S., Moultrie, Ga.; Southern

Dental College, Atlanta, 1905; died April 15; aged 65.

Peters, John L., Bronx, N. Y.; New York College of Dentistry, 1909; died May 18; aged 73.

Robertson, Duncan P., Chicago, Ill.; Temple University School of Dentistry, 1892; died April 30; aged 74.

Saner, Arthur Ward, St. Louis, Mo.; Denver College of Dentistry, 1894; died April 22; aged 73.

Sax, William I., Coxsackie, N. Y.; New York College of Dentistry, 1904; died May 1; aged 65.

Schutz, Julius W., Milwaukee, Wis.; died April 16; aged 58.

Silver, Harry T., Walnut Creek, Calif.; died April 24; aged 67.

Skinner, Harry James, Milton, Mass.; Harvard University Dental School, 1912; died February 19.

Skinner, Harold R., Attica, N. Y.; University of Buffalo, School of Dentistry, 1902; died May 23; aged 65.

Smith, Ervin E., Plainview, Minn.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1901; died April 15; aged 67.

Smith, Lawson, Sr., Lexington, Ky.; University of Louisville, School of Dentistry, 1901; died May 9; aged 68.

Smith, O. L., Corsicana, Texas; State Dental College, Dallas, 1907; died April 1; aged 69.

Stephens, George E., Kenosha, Wis.; Northwestern University Dental School, 1908; died April 21; aged 62.

Sterz, Percy H., Milwaukee, Wis.; Marquette University, School of Dentistry, 1919; died April 14; aged 46.

Travis, Clarence W., Bay Shore, N. Y.; New York College of Dentistry, 1895; died May 19; aged 74.

Wall, Charles A., San Francisco, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1917; died January 13.

Wall, Charles A., Columbus, Ohio; Ohio Medical University, College of Dentistry, 1905; died March 13; aged 70.

Walters, A. J., Hattiesburg, Miss.; Atlanta Dental College, 1911; died March 10.

Walton, Philip J., Oakland, Calif.; College of Physicians and Surgeons of San Francisco, a School of Dentistry, 1903; died April 9.

Way, Thomas Irving, Cincinnati, Ohio; Ohio College of Dental Surgery, 1894; died March 16; aged 81.

Wellman, Charles Hale, Northfield, Minn.; died March 1; aged 74.

Wertz, Frank A., Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1918; died March 11; aged 50.

Westenhaver, Earl H., Kansas City, Mo.; State University of Iowa, College of Dentistry, 1904; died March 24; aged 63.

Williams, John A., Fort Wayne, Ind.; Temple University School of Dentistry, 1889; died February 16; aged 82.

Willis, George A., Bel Air, Md.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1925; died May 12.

Winans, James E., Glendale, Calif.; died March 29; aged 85.

Withers, William Lee, Salt Lake City, Utah; Indiana Dental College, 1905; died March 15; aged 61.

Wofford, Wilbur P., Plainview, Texas; Baylor Dental College, 1942; killed in a glider crash in England, December 12. Dr. Wofford was a captain in the United States Army Dental Corps.

Womack, A. A., Manchester, Tenn.; University of Tennessee, College of Dentistry, 1900; died March 18.

Wood, W. Dale, Houston, Texas; Texas Dental College, 1934; died February 8; aged 40.

Young, Arthur E., Corvallis, Wash.; Northwestern University Dental School, 1896; died March 27; aged 73.

CURRENT LITERATURE

Effect of Sulfathiazole in Chewing Gum in Certain Oropharyngeal Infections. By N. Fox, R. G. Kesel, E. R. Neary and R. H. Herbine. Arch. Otolaryng. 41:278, April 1945.

The most effective sulfonamide drug was determined by studies of the salivary levels of sulfonamide compound attained by apparently normal adult subjects while chewing for one hour gum tablets containing sulfanilamide, sulfathiazole or sulfadiazine. All saliva secreted was collected at definite consecutive intervals and spectrophotometric determinations of the sulfonamide content were made of filtered portions. A distinct pattern of salivary level was obtained for each of the three drugs. From considerations of relative antibacterial potency and systemic toxicity, it appeared that chewing gum containing sulfathiazole was preferable for local chemotherapy.

A group of twenty-two persons were instructed to chew sulfathiazole gum tablets containing 0.25 gm. of the drug for one-half hour every hour for twelve hours. Adults chewed two tablets at a time and children one. Blood determinations were made by the micromethod at definite intervals. At the end of twelve hours, all gave evidence of the drug in the blood stream, but in only five was it present in measurable quantity. A history of sensitivity to the drug is, therefore, a contraindication to its use.

To estimate variations in number and kind of oral bacteria, control rinsings were obtained and cultured either before treatment was begun or after the oral condition had returned to normal. Treatment usually consisted in having the patient chew a tablet containing 0.25 gm. of sulfathiazole for one hour every three hours, except when a severe infection of the throat was present, in which case one hour of chewing was alternated with one hour of rest. Patients were divided into groups under five headings; ulceromembranous stomatitis, acute follicular tonsillitis, acute lymphoid pharyngitis, acute and chronic salivary adenitis and hyperplastic pansinusitis and stomatitis. The results of comparative studies of the oral flora were so variable under the method used that no conclusions could be drawn in regard to changes in the bacterial flora. There was a tendency in the majority of cases for the total number of bacteria to diminish, but in some the total counts increased despite the chewing of gum. Usually, the rise was due to an increase in supposedly less virulent types of organisms, such as diplococcic and bacillary types. In thirty-eight cases of ulcerative stomatitis, a decrease in total count was noted in 67 per cent, with a 75 per cent decrease in beta streptococci within forty-eight hours. Even more spectacular was the rapid clinical resolution of these conditions.

In experiments conducted on ten normal persons, the count of oral bacteria in mouth rinsings was determined after use of nonmedicated and medicated gum. Seven showed a reduction in bacterial counts as compared with control values when nonmedicated gum was used. Eight of the subjects showed a striking reduction in bacterial counts following the chewing of medicated gum.—*J. Edward Gilda.*

The Paramolar Tubercle (Bolk). By A. A. Dahlberg. Am. J. Phys. Anthropol. 3(New Series):97, March 1945.

Bolk believed that supernumerary teeth were atavistic and ascribed significance to such findings. He further believed that the human deciduous dentition at one time contained more posterior teeth in each quadrant than it has today and that these were last in the process of evolution. The last teeth were supposed to be represented in the modern human dentition by the occasional appearance of supernumerary teeth buccally from and between the first and second permanent molars. These supernumerary teeth (called paramolars) were believed to fuse at times with the adjacent permanent molars during development, leaving only a cusp on the molars as evidence of their former presence. This cusp, which is found occa-

sionally on the anterior portion of the buccal surface of the second and third molars, is called the paramolar tubercle. Since Bolk failed to find this tubercle on the first permanent molar, he classified this tooth in the deciduous series (which is buccally from the arch of the permanent teeth). Thereby, the first permanent molar could have no tooth buccally to it and could not in any case have a paramolar tubercle.

Three instances of the bilateral occurrence of Bolk's paramolar cusps on lower first permanent molars are believed to be an adequate basis for rejection of Bolk's theory. In addition, the weight of paleontologic evidence is against the theory. Paramolar cusps are not atavistic and have only the significance of stylor cusps.—*J. Edward Gilda.*

Gingivitis Among Submarine Personnel; A Comparative Study. By O. E. Van Der Aue and V. R. Cullen. U. S. Nav. M. Bull. 44:811, April 1945.

A study of the incidence of gingivitis in 1,243 submarine and 411 submarine tender personnel revealed that bleeding of the gums was more common among submarine crews returning from war patrols than among a tender crew, in the ratio of 5 to 3. Vincent's infection was present in 1.4 per cent of the submarine crews, while no cases were found among the tender personnel. The dietary aboard the submarine was found to be of higher quality than that on most Navy surface vessels and advance bases. The men, in general, gave no clinical evidence of avitaminoses. Local treatment usually cleared up all cases of gingivitis in a few days. It is concluded that the gingivitis in these cases was not due to the lowering of general and local immunity as a result of avitaminoses, but was due solely to the lowering of local immunity by local trauma or irritation and a lack of oral hygiene.—*J. Edward Gilda.*

Salivary Sulfonamide Levels After Chewing Paraffin and Chicle Vehicles. By C. C. Pfeiffer and H. L. Holland. U. S. Nav. M. Bull. 44:695, April 1945.

Saliva samples were collected during time intervals of 0-5, 5-10, 10-15, 25-30, 55-60 and 85-90 minutes. At least nine subjects were used for each of the four wafers tested (sulfathiazole in chicle and in medicated paraffin, and sulfadiazine in commercial and noncommercial medicated paraffin). Sulfonamides were analyzed in both the supernatant fluid and the sediment. Sulfathiazole, whether chewed in chicle or paraffin, promptly attained a high salivary level, which was maintained for ninety minutes. The average peaks were 37 mg. and 44 mg. per hundred cubic centimeters for paraffin and chicle, respectively. Sulfadiazine did not attain a high salivary level until the vehicle had been chewed for ninety minutes. The average peak for both commercial and noncommercial sulfadiazine wafers was 29 mg. per hundred cubic centimeters. A paraffin vehicle tends to fragmentation in the first fifteen minutes of chewing; whereas a chicle vehicle tends to fragmentation in the sixty to ninety minute period. Blood levels were determined in eight subjects at the end of six hours of continuous chewing without expectoration. These varied from a trace to 1.25 mg. per hundred cubic centimeters. No significant difference between the blood levels of subjects chewing the two sulfonamides was noted.—*J. Edward Gilda.*

Fluorine in Fish Pastes. By Warren Harvey. Nature 155:175, February 10, 1945.

Some fish-paste manufacturers obtained their supplies from fresh fish and others from canned, before the war. It is believed that some manufacturers now use macerated whole fish in the mixture. Analyses of five well-known brands of fish paste revealed a fluorine content of from 3.1 to 8.9 parts per million by weight. A quarter of a pound of fish paste (of the higher fluorine content brands) would give 1 mg. of fluorine, the minimum concentration suggested as necessary in the daily diet for the prevention of caries.—*S. Wah Leung.*

Aerosinusitis: A Résumé. By Paul A. Campbell. Ann. Otol., Rhin. & Laryng. 54:69, March 1945.

Aerosinusitis is defined as an acute or chronic inflammation of one or more of the nasal accessory sinuses produced by a barometric pressure difference between the

air or gas inside the sinus and that of the surrounding atmosphere. Pain over the area of the sinuses is usually present, and mucosal or submucosal hemorrhage may occur. Aerosinusitis may be divided into nonobstructive aerosinusitis, a condition in which the ostium is unobstructed, allowing free flow of air or gas or fluid in and out of the sinus during ascent and descent; and obstructive aerosinusitis, wherein the ostium is blocked by swollen or redundant tissue or an anatomic deformity. Aerosinusitis must be differentiated from purulent and catarrhal sinusitis, but diagnosis is usually simplified by a history of pain over one or more of the sinuses during or shortly after exposure to extensive barometric pressure changes. Treatment consists of establishing ventilation by the method best suited for the case at hand. Any procedure that will increase fluid production inside the sinus cavity will aid pressure equalization. As a prophylactic measure, in upper respiratory infections, nasal allergy or nasal obstruction, great barometric pressure changes should not be employed unless adequate nasal and sinal ventilation exists.—*S. Wah Leung.*

Bactericidal Efficiency of Iodine Solutions and Organic Mercurial Antiseptics. By Louis Gershenfeld and George W. Patterson, Jr. Am. J. Pharm. 117:5, January 1945.

In vitro investigations were conducted to compare the bactericidal efficiency of iodine solutions with that of organic mercurial antiseptics in common use employing a thioglycollate medium for the transplants. The iodine test solutions used were: solution of iodine, Lugol's solution, tincture of iodine and mild tincture of iodine, containing 1.94, 4.94, 6.93 and 1.94 per cent free iodine, respectively. These were compared with five proprietary organic mercurials obtained on the open market in original unopened containers.

In the first series of tests, the undiluted antiseptics were kept constant, while the amounts of broth culture of the test organisms were increased. In this manner, the antiseptic became diluted and there was constantly added increased amounts of organic matter and bacteria. The temperature employed was 20 C., approximating that of the environment. In these tests, using thioglycollate medium, all iodine solutions were effective within one minute when 1 cc. of each of these iodine solutions was used against 25 cc. of broth culture of standard (F.D.A.) strains of *Staph. aureus* and *E. typhosa.* None of the proprietary organic mercurials tested gave findings approaching this as to effectiveness.

In the second series of tests, the F.D.A. phenol coefficient test was used except that the transplants were made to a thioglycollate medium instead of F.D.A. broth. The findings showed that for all of the proprietary organic mercurials tested, the highest dilution that was effective within five minutes against *E. typhosa* was 1:5, and against *Staph. aureus,* 1:3. The iodine solutions, in the same period of time, with the weakest iodine preparation for comparison, were effective within five minutes against *E. typhosa* in a 1:300 dilution and against *Staph. aureus* in a 1:150 dilution.

The authors conclude that "the above comparative values show the markedly greater bactericidal efficiency of iodine solutions as compared with the proprietary organic mercurial antiseptics employed in this study."—*S. Wah Leung.*

Similarity of Mouth and Vulvar Lesions. By John Parks. Am. J. Obst. and Gynec. 49:396, March 1945.

The embryologic, anatomic and physiologic structure between the mucosa of the mouth and of the vulva are similar. A review of certain local and systemic infections which affect both areas included a study of the color of the mucosa; changes in menstruation, pregnancy and the menopause; blood dyscrasia; local infection; tumors, and systemic diseases, including avitaminoses. It is pointed out that the patient may complain of symptoms from only one area, when similar lesions can be found both on the vulva and in the mouth. The importance of a thorough examination of both areas is stressed, especially since women frequently consult the doctor early about mouth lesions, but are somewhat reluctant to seek advice at the onset of symptoms of genital infections.—*S. Wah Leung.*

Foreign Bodies of the Maxillary Sinus. By John Clair Howard, Jr. Ann. Otol., Rhin. and Laryng. 54:186, March 1945.

The presence of foreign bodies in the nasal accessory sinuses is due mainly to trauma or follows surgical procedures. The antrum of Highmore is the most common site of lodgment of foreign bodies. Its anatomic location, particularly its proximity to the teeth, results in pushing of teeth or pieces of teeth into the antrum during extraction.—*S. Wah Leung.*

Effect of Subanesthetic Nitrous Oxide-Oxygen Mixtures on Pain Sensitivity of the Tooth. By Alfred H. Chambers and George G. Schultz. J. D. Res. 24:1, February 1945.

Inhalation of nitrous oxide ranging from 10 to 70 per cent increased the threshold for just bearable pain, but only slightly affected that for just perceptible sensation. The time required to reach maximum effect ranged from two to six minutes.—*Alfred H. Chambers.*

Clinical Observations on Pigment Variations in Healthy Oral Tissues of the Negro. By Clifton O. Dummett. J. D. Res. 24:7, February 1945.

As a result of a short preliminary clinical study of the healthy oral tissues of fifty Negro patients, it was found that the color of the gingivae in the healthy mouths of this particular group presented considerable variation, from a pale pink to purplish black. The gingivae showing little or no pigmentation are perfectly normal, except in those cases in which histories of local and systemic disease intimate that these conditions are responsible for the discoloration. Diagnosis of disease solely on the basis of color changes is, therefore, difficult and unreliable.—*Clifton O. Dummett.*

Bacteriological Appraisal of Adhesive Denture Powders. By H. A. Bartels. J. D. Res. 24:15, February 1945.

Four brands of denture powders (Wernet's, Co-re-ga, Holdent and Fasteeth) used by individuals to increase the stability of dentures were tested to determine whether they possessed bacteriostatic qualities. *Staphylococcus aureus, E. coli* and the microorganisms of saliva that grow aerobically on blood-agar were cultured in contact with the adhesive powders. No inhibition of any of these bacteria was observed. Since certain individuals become sensitive to chemical agents even in minimal amounts when exposed to them over long periods of time, it is questionable whether the incorporation of inhibitory agents in denture powders would be advisable.—*Henry A. Bartels.*

Changes in the White Cell Count Following Tooth Extraction in Albino Rats and Rabbits. By George J. Anday and Ralph L. Ferguson. J. D. Res. 24:17, February 1945.

Tooth extraction in fifty-one albino rats and twenty-three rabbits was performed under ether anesthesia. Preliminary blood studies were performed on each of the animals, which were kept under uniform conditions. Blood counts were performed immediately, and frequently, after tooth extraction. In normal animals, tooth extraction elicits an immediate leukopenia, which is followed by leukocytosis, whereas skin incision in the same animals causes leukocytosis only, without the previous leukopenia. A similar result to that in tooth extraction is obtained on animals splenectomized four months before tooth extraction. Benzene treatment of rabbits causes leukopenia, which is further aggravated by tooth extraction, without subsequent leukocytosis. Adenylic acid causes leukocytosis in rabbits. Tooth extraction furthers the leukocytosis, without the initial leukopenic stage. The use of pentnucleotide in rabbits causes marked leukopenia, followed by leukocytosis. Tooth extraction furthers the leukopenia in the first and leukocytosis in the second stage. It is possible that, in some cases of agranulocytosis initiated by tooth extraction, tooth extraction depresses the white cell count with a similar mechanism to that observed on benzene-treated animals.—*G. J. Anday.*

Studies on the Fermentation of Sorbitol by Oral Microorganisms. By Thomas C. Grubb. J. D. Res. 24:31, February 1945.

An attempt was made to estimate quanti-

tatively the number of individuals whose saliva contains sorbitol-fermenting microorganisms, and the percentage of sorbitol fermenters in the saliva. The technical difficulties involved in such a procedure probably invalidated the results obtained.

By inoculating with 122 samples of saliva nutrient or trypticase broth containing M/10 concentrations of sorbitol, sucrose and dextrose, the pH and titratable acidity developing in these cultures incubated for twenty-four hours at 37 C. under aerobic conditions were determined. Sorbitol was fermented much more slowly than either of the other sugars and seldom reached a pH of 5.0.

Fifty-five samples of saliva were incubated in a modified Brewer's thioglycollate medium for anaerobic cultivation and the developing pH values determined. Sorbitol, sucrose and dextrose in M/10 concentrations were placed in this medium and the sorbitol was found to be fermented much more slowly than the other sugars.

Strains of *L. acidophilus,* oral streptococci, yeasts and mixtures of yeasts and *L. acidophilus* were employed to inoculate trypticase broth containing M/10 concentrations of sorbitol, sucrose and dextrose. These test organisms were also employed to inoculate a modified thioglycollate medium containing M/10 concentrations of the above-mentioned sugars. In all cases, sorbitol was fermented more slowly than the other sugars. It is suggested that, in view of its slow fermentation, sorbitol might be used for preventing or controlling dental caries.—*Thomas C. Grubb.*

Classification of Consumer-Expenditures by Income-Elasticity. By Louis J. Paradiso. Survey of Current Business, U. S. Department of Commerce, January 1945.

During the period from 1929 to 1940, the amount of dental service purchased by the public showed a "somewhat sensitive" relationship to the year-to-year fluctuations in total disposable income. For a given percentage decrease or increase in income, the respective decrease or increase in expenditures for dental service had an index value of 0.90. To state this fact in another way: a 10 per cent rise in disposable income in a given year theoretically would have caused a 9 per cent increase in public expenditures for dental service; while a 10 per cent decrease in income would have been reflected in a 9 per cent decrease in expenditures. Other items in the "Medical Care and Death Expense" category deflected a varying sensitivity to changes in the total economy. Expenditures for physicians' services, for instance, were found to be relatively insensitive, with an index of 0.76. Expenditures for care in privately controlled hospitals and sanitariums were among the least sensitive, showing an index of 0.35. The most sensitive item in the medical care and death expense series was net payments to group hospitalization and health associations, with an index of 3.00. Thus, a 10 per cent increase in disposable income in a given year theoretically would have caused a 30 per cent increase in expenditures by the public for prepayment hospital and medical care; or a 10 per cent decrease in income would have resulted in a 30 per cent drop in expenditures for prepayment plans.

The study lists 174 consumer expenditure items, classified into three groups as showing (1) little fluctuation, (2) approximately similar proportionate changes and (3) sharp changes in relation to variations in disposable income. An inspection of the items within each group reveals that they also fall generally into the classic three-way division of economic goods; i.e., necessities, conveniences and luxuries. Among the items in the insensitive group are shoes, barbershop services, fuel and utilities, life insurance, local transportation and private elementary and higher education. Curiously, or perhaps not so curiously, expenditures for motion pictures, daily fee golf courses and magazines, newspapers and sheet music are classified as insensitive. Classified in the same group with expenditures for dental service are clothing and accessories, beauty shop services, refrigerators, washing and sewing machines, books, professional baseball, billiard parlors and bowling alleys, airline transportation and commercial, business and trade school fees. Among the most sensitive group are expenditures for jewelry and watches, furniture, net payments to labor unions, new cars, taxicab service, intercity railway transportation, legitimate theaters and opera and radios.—*J. E. Bagdonas.*

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National

American Dental Hygienists' Association, Chicago, September 17-19. A. Rebekah Fisk, 1704 N. Troy St., Arlington, Va., Secretary.

American Dietetic Association, Cincinnati, October 15-19.

National Board of Dental Examiners, August 20-21. Gordon L. Teall, Box 71, Hiawatha, Kan., Secretary.

Montreal Dental Club Annual Fall Clinic, October 24-26. M. L. Donigan, Drummond Medical Bldg., Montreal, Director.

State

Alabama: Board of Dental Examiners, Birmingham, July 2. Farrar McCrummen, Woodward Bldg., Birmingham, Secretary.

Arizona: State Dental Board, Phoenix, October 10. R. K. Trueblood, 25 N. Second Ave., Glendale, Secretary.

District of Columbia: Dental Society, Washington, second Tuesday of each month. J. Walter Bernhard, 1835 Eye St., N.W., Washington, Secretary.

Indiana: State Board of Dental Examiners, Indianapolis, August 20-23. Carl A. Frech, Gary National Bank Bldg., Gary, Secretary.

Maine: Board of Dental Examiners of State of, Augusta, June 18-20. Carl W. Maxfield, 31 Central St., Bangor, Secretary.

Minnesota: State Board of Dental Examiners, Minneapolis, August 27-September 1. G. R. Metcalf, Barnesville, Secretary.

Montana: State Board of Dental Examiners, July 9-14. C. H. Swanson, Columbus, Secretary.

Nebraska: Board of Dental Examiners, Lincoln, August 22-25. C. A. Bumstead, 924 Stuart Bldg., Lincoln, Secretary.

New Jersey: State Board of Registration and Examination in Dentistry, July 9-12. J. F. Burke, 150 E. State St., Trenton, Acting Secretary.

North Dakota: State Board of Dental Examiners, Fargo, July 9-12. Richard Krause, Bismarck, Secretary.

Wisconsin: State Board of Dental Examiners, Milwaukee, July 9-13. S. F. Donovan, Tomah, Secretary.

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Eastman Dental Dispensary, Rochester, N. Y. Director, Harvey J. Burkhart.

Research and Educational Hospital, University of Illinois Medical Center. Address Dean, University of Illinois, College of Dentistry, 808 S. Wood St., Chicago 12.

Richmond Freeman Memorial Clinic for Infants and Children, Dallas, Texas. Dora B. Foster, 3617 Maple Ave., Dallas, Executive Director.

Walter G. Zoller Memorial Dental Clinic, University of Chicago. Address Director, Walter G. Zoller, Memorial Dental Clinic, University of Chicago, Chicago 37.

Carnegie Fellowships for Research and Graduate Work in the Dental Sciences, University of Rochester. George H. Whipple, Rochester, Dean.

Pathology, Dental and Oral, Fellowship in, Army Institute of Pathology. Address Director, American Registry of Pathology, Army Institute of Pathology, Army Medical Museum, 7th and Independence, S.W., Washington 25, D.C.

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